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Professor Conway on Philadelphia Labor Conditions

ELECTRIC RAILWAY JOURNAL

New York, November 4, 1916 McGraw Publishing Co., Inc. Vol. 48, No. 19 10c a copy

130
HOUSTON LYCEUM CARNEGIE LIBRARY HOUSTON, TEX.

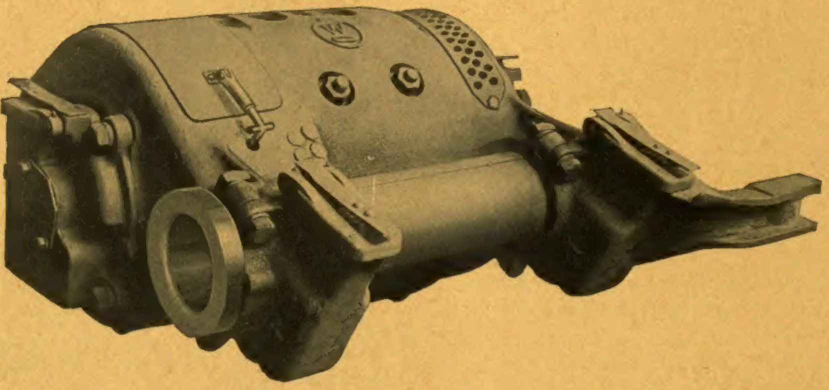
A few of the many Philadelphia streets where it is considered "worth while" to insure the best possible trolley service. Philadelphia uses miles and miles of Phono-ctric—the wire of long life.

idgeport Brass Company, Bridgeport, Conn.

Westinghouse

No 506

25 Horsepower



Our Standard for Light-Weight Cars

"The Little Giant"

The Westinghouse Electric 1916 contribution to the Electric railway industry. Westinghouse Electric, several years ago, developed the first "Baby" motor for 24-inch wheels, which brought about such wonderful economies. Westinghouse Electric was the first to develop and build "Wee" motors, which are now in great demand. The No. 506 is the standard for light-weight cars with 24-inch to 33-inch wheels.

We have a Standard
Motor for every purpose

WESTINGHOUSE ELECTRIC

Leaflet 3901 gives details
Ask nearest office for a copy

Westinghouse Electric & Manufacturing Company

East Pittsburgh, Pa.

Atlanta, Ga.
Baltimore, Md.
Birmingham, Ala.
Bluefield, W. Va.
Boston, Mass.
Buffalo, N. Y.
Butte, Mont.
Charleston, W. Va.
Charlotte, N. C.
Chattanooga, Tenn.
Chicago, Ill.
Cincinnati, Ohio
Cleveland, Ohio
Columbus, Ohio
*Dallas, Tex.
Dayton, Ohio
Denver, Colo.
Des Moines, Iowa
Detroit, Mich.
Duluth, Minn.
*El Paso, Tex.
*Houston, Tex.
Indianapolis, Ind.
Joplin, Mo.
Kansas City, Mo.
Louisville, Ky.
Los Angeles, Cal.
Memphis, Tenn.
Milwaukee, Wis.
Minneapolis, Minn.
New Orleans, La.
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Omaha, Neb.
Philadelphia, Pa.
Pittsburgh, Pa.
Portland, Ore.
Rochester, N. Y.
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Salt Lake City, Utah
San Francisco, Cal.
Seattle, Wash.
Syracuse, N. Y.
Toledo, Ohio
Washington, D. C.
Wilkes-Barre, Pa.
*W. E. & M. Co. of Texas

459

ELECTRIC RAILWAY JOURNAL

VOLUME XLVIII, No. 19 NEW YORK, NOVEMBER 4, 1916 PAGES 959 TO 1002

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JAMES H. MCGRAW, President. A. E. CLIFFORD, Secretary. J. T. DE MOTT, Treasurer. H. W. BLAKE, Editor.

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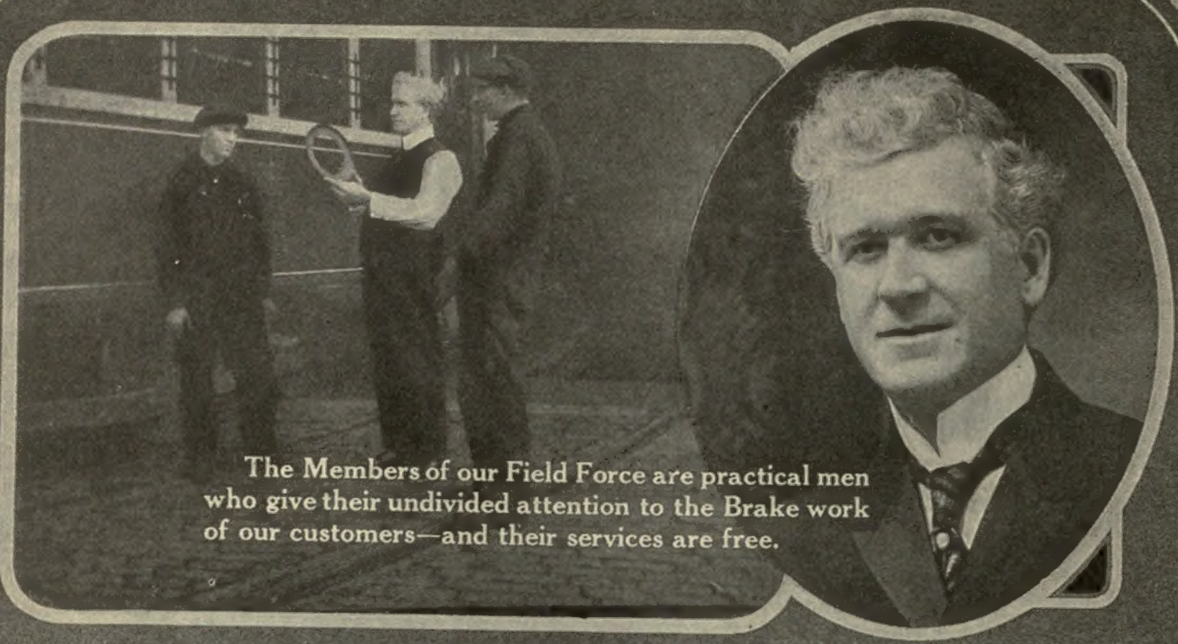

The Members of our Field Force are practical men who give their undivided attention to the Brake work of our customers—and their services are free.

A prominent official recently said:
"We signed a three-year contract with the Westinghouse Traction Brake Company largely because of the invaluable help their Mechanical Experts give us."

Westinghouse Traction Brake Company

General Offices: Wilmerding, Pa.

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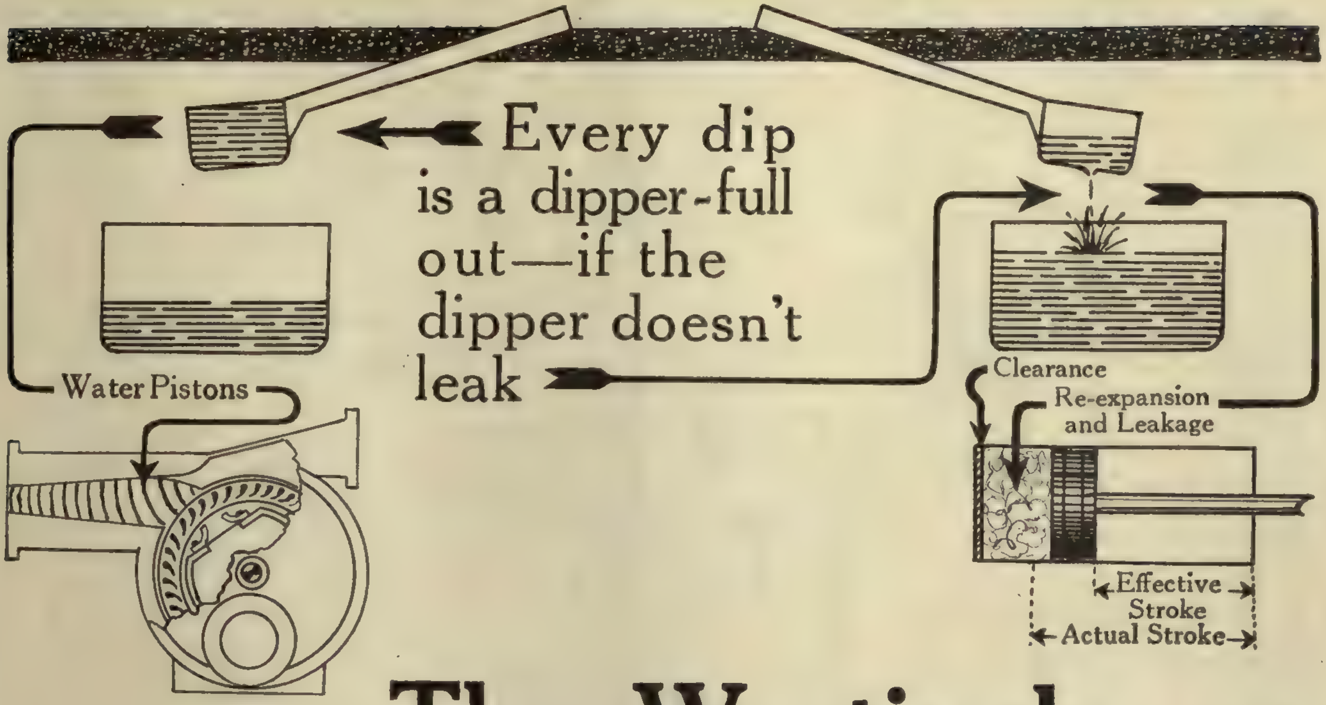
Westinghouse Building

CHICAGO:
Railway Exchange Building

TRADE MARK

NEW YORK:
City Investing Building

ST. LOUIS:
Boatmen's Bank Building



Every dip is a dipper-full out—if the dipper doesn't leak

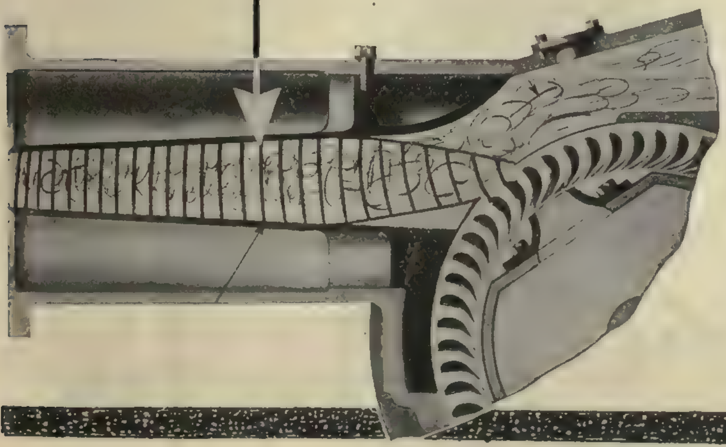
The Westinghouse Leblanc Air Pump

with which all Westinghouse Condensers are equipped, is like a bright, new dipper in its operation. Every water piston is a dipper-full out—with no back drip. The water pistons follow each other in such rapid succession that the removal of air is as sure and as constant as the law of gravitation.

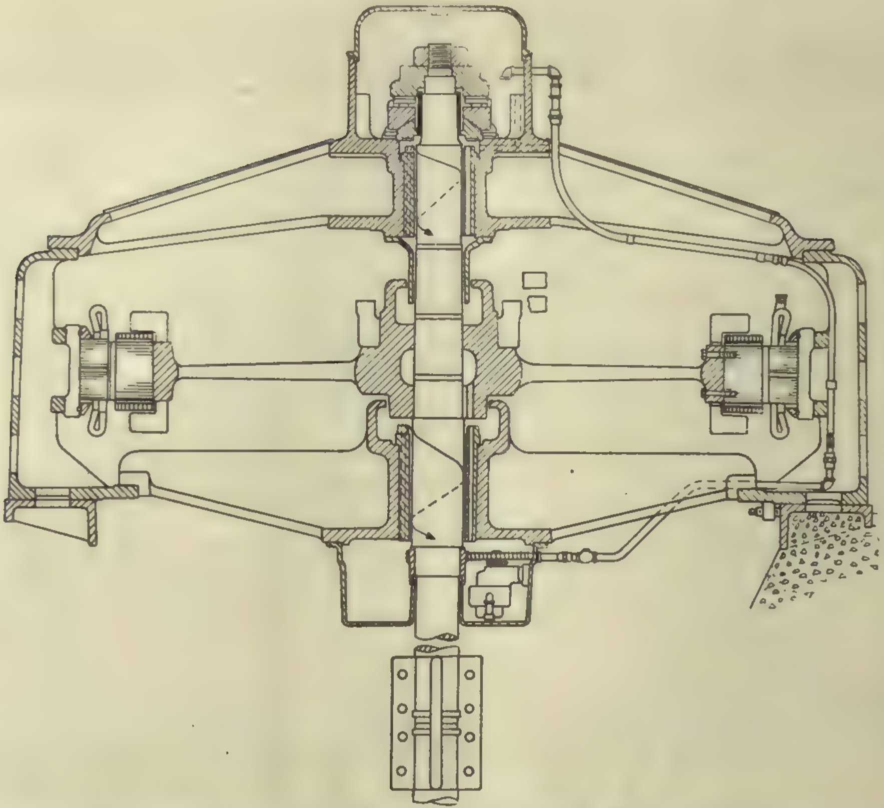
This is one of the "secrets" of the

High Vacuum

and the satisfactory operation of our Condensers.



**Westinghouse
Electric & Mfg. Co.
East Pittsburgh, Pa.**



Cross Section of Westinghouse Vertical Water-Wheel Generator

W
WESTINGHOUSE
ELECTRIC

Westinghouse
Vertically-Driven
Water-Wheel Generators

Designed for Maximum Service, Minimum Maintenance, High Efficiency and Reasonable First Cost

Kingsbury thrust bearing to support rotating parts, simple rugged and efficient. Guide bearings to center rotor in stator are all aligned and supported direct from stator frame.

Oiling system is self-contained, air cooled and has reliable circulation through brass piping.

Bedplate is a single circular pad, easy to align.

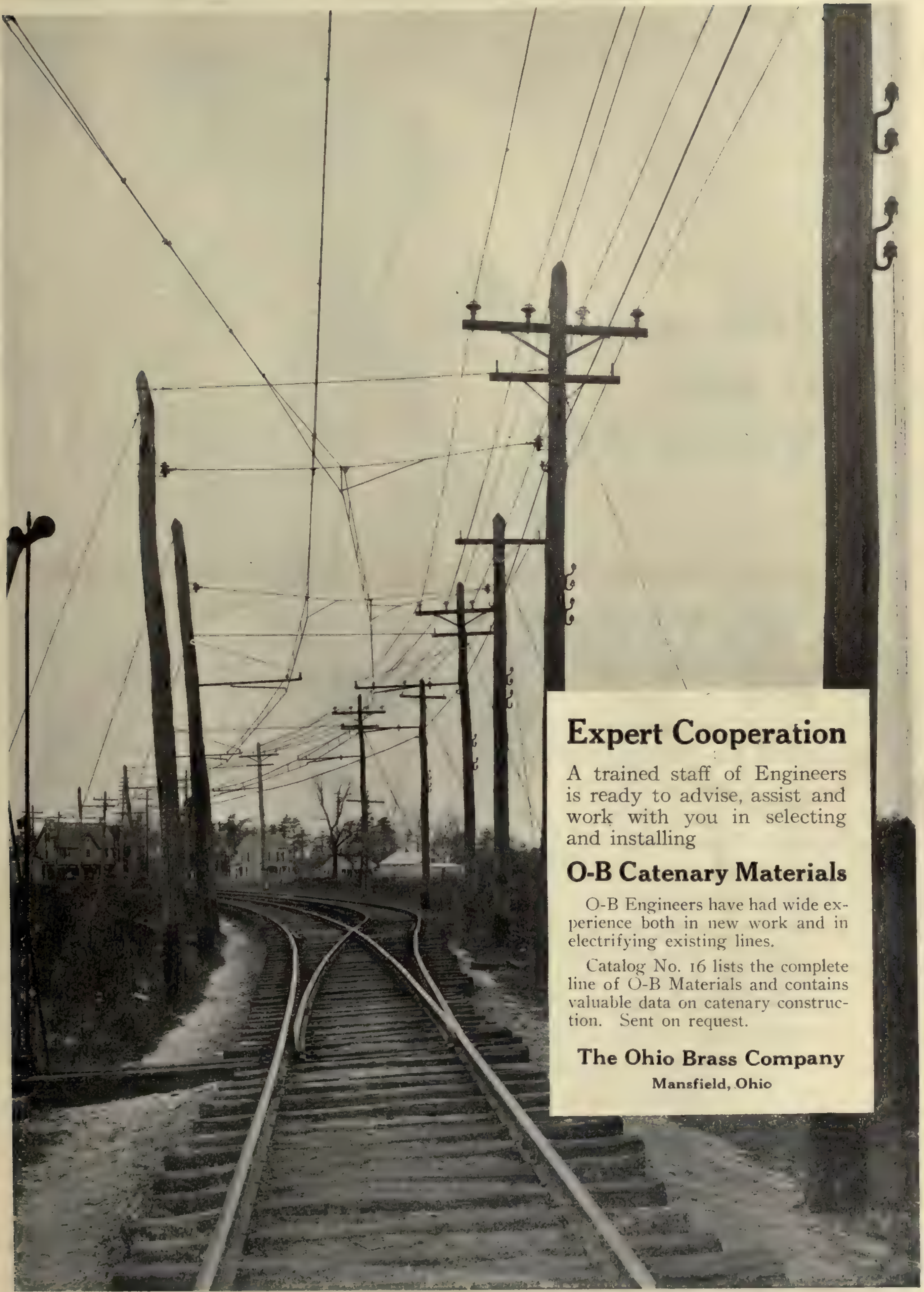
Windings are insulated with high dielectric-strength, heat-resistant materials.

Armature coils are protected from mechanical injury by enclosing frame. All cross connections are, for greater accessibility, in upper side of frame.

All leads, and oil piping, are brought to base inside the frame.

Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.
Sales Offices in All Large American Cities

Westinghouse



Expert Cooperation

A trained staff of Engineers is ready to advise, assist and work with you in selecting and installing

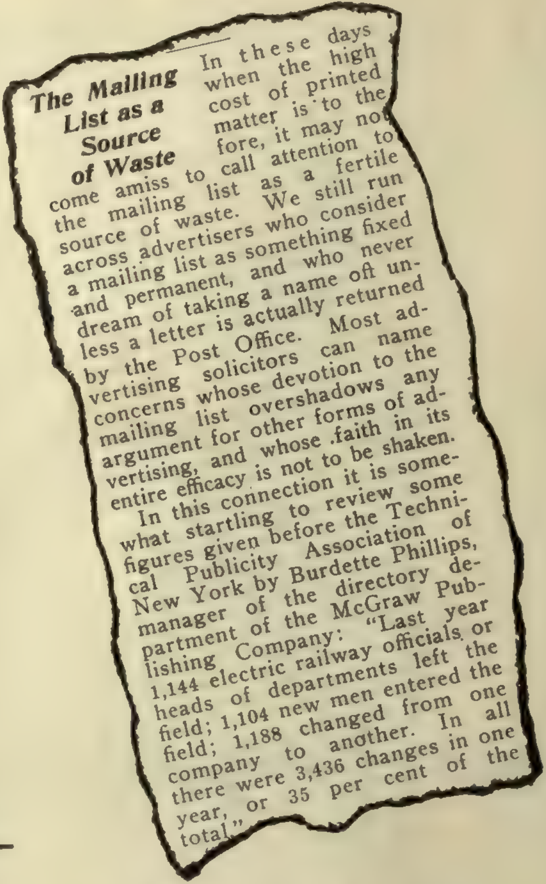
O-B Catenary Materials

O-B Engineers have had wide experience both in new work and in electrifying existing lines.

Catalog No. 16 lists the complete line of O-B Materials and contains valuable data on catenary construction. Sent on request.

The Ohio Brass Company
Mansfield, Ohio

How accurate is your mailing list?



The Mailing List as a Source of Waste

In these days when the high cost of printed matter is to the fore, it may not come amiss to call attention to the mailing list as a fertile source of waste. We still run across advertisers who consider a mailing list as something fixed and permanent, and who never dream of taking a name off unless a letter is actually returned by the Post Office. Most advertising solicitors can name concerns whose devotion to the mailing list overshadows any argument for other forms of advertising, and whose faith in its entire efficacy is not to be shaken.

In this connection it is somewhat startling to review some figures given before the Technical Publicity Association of New York by Burdette Phillips, manager of the directory department of the McGraw Publishing Company: "Last year 1,144 electric railway officials or heads of departments left the field; 1,104 new men entered the field; 1,188 changed from one company to another. In all there were 3,436 changes in one year, or 35 per cent of the total."

Glance over this editorial—

(From the July 27 issue of Printers' Ink)

—and let the figures sink in

35 per cent of the official personnel of the country's electric railways changed in one year.

Manufacturers who serve the electric railway field find great difficulty in keeping in touch with all these changes—but you can bet that the **Journal** reaches these men regularly. Because the men involved realize that the service of the **Journal** is so continuously valuable that they can't afford to miss it.

They recognize the **Journal** as one of the most effective helps to them in the doing of their daily work.

That is why the **Journal** follows them—no matter what changes they make in their connections—as long as they remain in the electric railway field.

And that is why no direct-by-mail selling plan can, **of itself,** give you complete service, because the mailing list cannot be 100 per cent accurate.

But you **can** reach **every** electric railway official, every week, through the advertising pages of the

Electric Railway Journal

if you *will* stick to hand-thrown signals, be consistent—

Don't lay the burden on your conductors—they have enough to do *now*.

And platform labor is your biggest single item of operating expense—use it efficiently.

Be consistent.

if you *want* your signalling done by hand, bribe some *real* Signal Corps men from the Guard, when they get back home—they're *experts*.

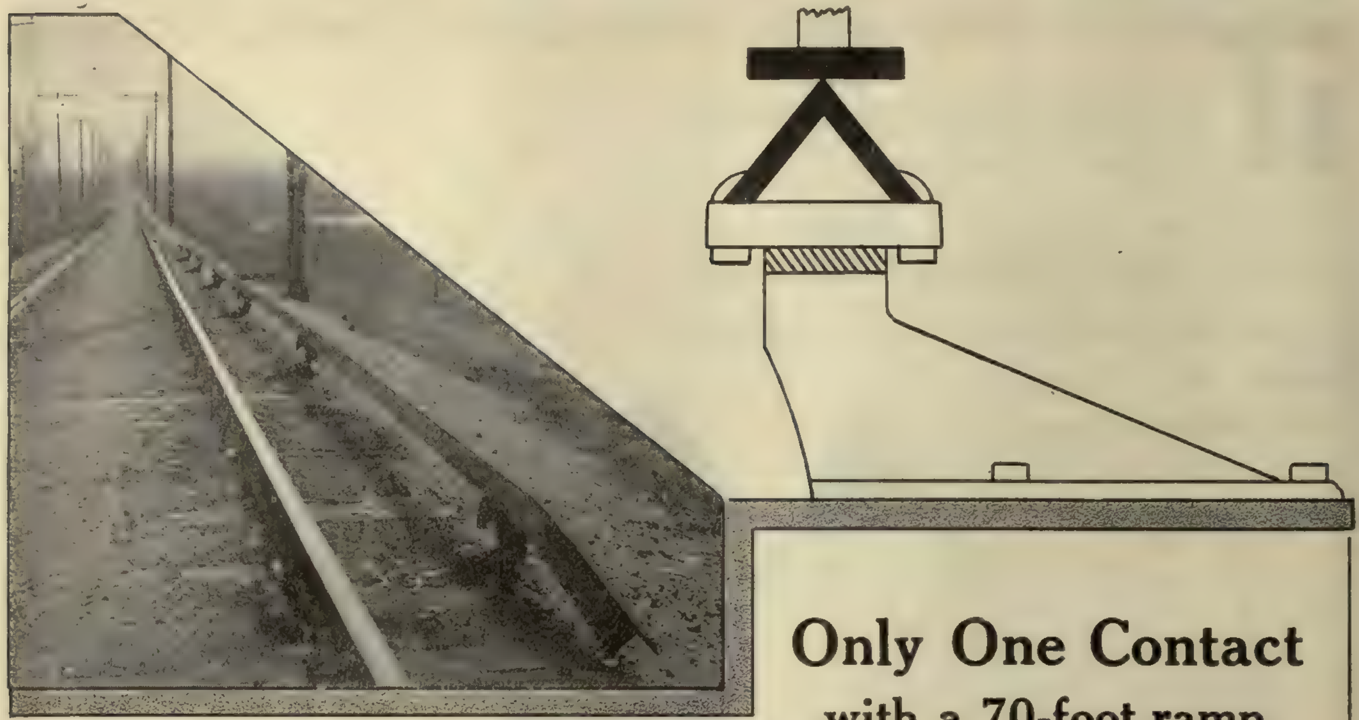
And, even at that, *no* manually-operated system of signals can *ever* be free from the *human element*—the thing that means danger at *most*, delay at *least*, and *always* dissatisfaction and expense.

Buy United States Electric Signals—install them—watch your worries *vanish*—and your dividends *increase*—

Because United States signals take the *responsibility* for *safety* out of human hands.

And they *do* keep the cars a-moving—yes, brother, they do: "muy pronto," as they say on the Border.

United States
Electric Signal Co.
West Newton, Massachusetts
Western: Frank F. Bodler
Monadnock Bldg., San Francisco
Chicago, Warren Moore Osborn
McCormick Bldg.
Foreign:
Forest City Electric Service Supply Co.
Salford, Eng.



Only One Contact
with a 70-foot ramp
is required by the

SIMMEN SYSTEM
of Continuous Cab Signals

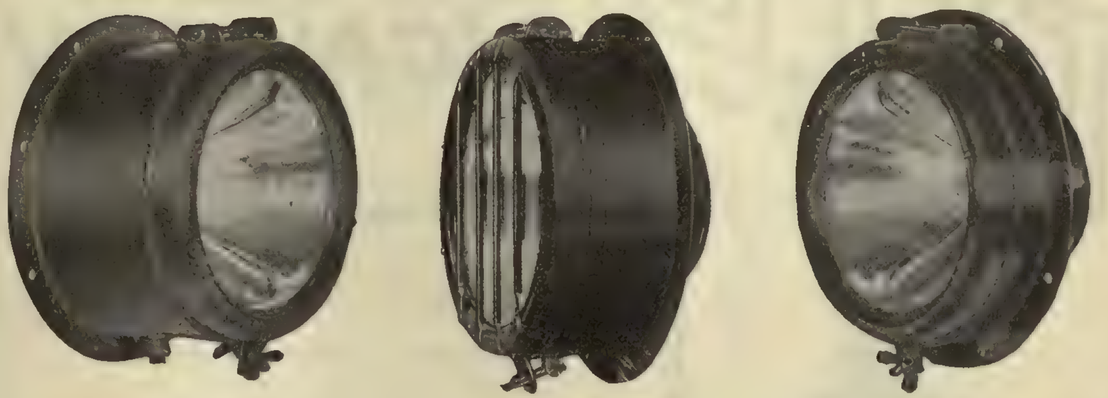
A great many people associate the idea of **continuous cab signals** with a continuous third rail. We presume that it is but natural to confuse the two ideas. The **fact** is that the third-rail equipment for a block consists of **only four sections** of ramp, each 70 feet long.

A west bound train makes contact with a "distant" rail 2000 feet from the siding and receives the dispatcher's orders. If a "meet" is to be made the cab light changes from **green** to **red.** The motorman has ample braking distance, **and the red light continues to burn.** He can't miss it or misinterpret it.

An east bound train also makes contact with a "distant" and "home" rail. The "inferior" train takes the siding, and when it is in the clear the dispatcher changes the signal in the cab of the "superior" train from red to green. After the "superior" train has left, the dispatcher reverses the control lever for that siding, and the "inferior" train then receives a clear signal as soon as its contact shoe touches the ramp.

There is no occasion to change the signal until the next block is approached, for the dispatcher's interlock makes lap orders impossible. The cab signal remains green and the motorman knows he has "right of way." We may also add that only one wire is necessary for all four contact rails. Positive current signals the east bound and negative current the west bound train.

Simmen Automatic Railway Signal Co.
1575 Niagara Street, Buffalo, N. Y.
Pacific Coast Representative—W. H. CRAWFORD, 609 Spalding Building, Portland, Oregon



These Are the Famous "Golden Glow" Headlights for City and Suburban Service—Buy Them Now

Because "GOLDEN GLOW" Headlights are scientifically correct in principle and design.

Because they project practically all of the light from the light source, thereby requiring lamps of minimum current consumption.

Because "GOLDEN GLOW" light penetrates fog to a greater extent than that projected by any other known headlight.

Because they are non-blinding, due to the fact that their greenish-yellow glass parabolic reflectors absorb the violet and blue rays.

Because "GOLDEN GLOW" Reflectors are true parabolas, being ground, polished and mirrored by special patented machinery.

Because "GOLDEN GLOW" Reflectors will not tarnish or depreciate in value; instead they retain their polished surface and efficiency indefinitely and can be cleaned without marring their surfaces in the least.

Because these advantages can be realized only by using "GOLDEN GLOW" Headlights.

Write for new catalog.

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Sts.

NEW YORK
50 Church St.

CHICAGO
Monadnock Bldg.

The T.D.B. SYSTEM OF SIGNALING

TRAFFIC DIRECTION BLOCK

(Bulletin 69—T. D. B. System—on request).

Particular attention is called to the following summary of results to be obtained by the use of this system. This will doubtless appeal to the executive, operating and engineering departments of all interurban railways.

FIRST:—MAXIMUM PROTECTION:—Each car has at all times one or two stop signals protecting it at the rear as well as head-on.

SECOND:—MAXIMUM SPEED:—A proceed signal means that the block is unoccupied.

THIRD:—SIMPLICITY OF OPERATION:—Each signal gives but two indications, stop and proceed. All apparatus is operated automatically; therefore, trainmen do not need to manipulate any part of the signal system. All cars receive the same indication to pass into a block.

FOURTH:—FACILITY OF OPERATION:—A car receiving a clear signal can proceed without delay. Each block is a unit with clearly defined limits; the absence of preliminaries insures that a car in one block does not affect other cars in or approaching adjoining blocks. A car may, therefore, at any time proceed promptly to a siding or meeting point.

FIFTH:—SIMPLICITY OF RULES:—There are only two indications, stop and proceed, which are so easily understood that trainmen are favorably impressed and appreciate the fact that they can be observed without difficulty or confusion.

SIXTH:—SHORTEST POSSIBLE HEADWAY UNDER FULL PROTECTION:—Opposing or following cars are spaced a minimum safe distance apart. Under a system requiring preliminaries the spacing is increased at certain places by a distance equal to the length of the preliminary without securing additional safety. The fact that the length of the preliminary does not always bear a fixed relation to the length of the block and that the preliminary may be at either end, means that all signals do not give the same information.

SEVENTH:—HIGH EFFICIENCY:—Standard apparatus and simple controlling circuits are used throughout.

EIGHTH:—ADAPTABILITY TO CONDITIONS:—This system is applicable to all track and traffic conditions.

The Union Switch & Signal Co.

Founded by Geo. Westinghouse 1881.

SWISSVALE, PA.

Trade Mark

Hudson Terminal Bldg.
NEW YORK

Peoples Gas Bldg.
CHICAGO

Canadian Express Bldg.
MONTREAL

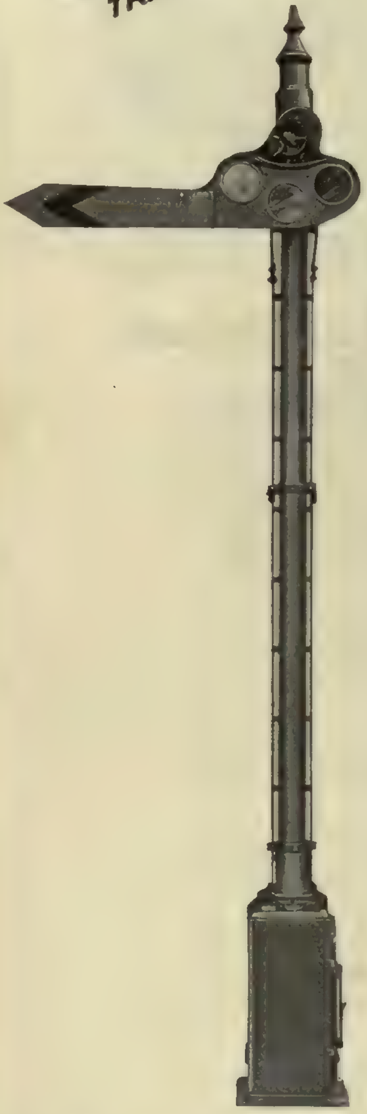
Candler Annex
ATLANTA

Railway Exchange Bldg.
ST. LOUIS MO.

Pacific Bldg.
SAN FRANCISCO

Trade Mark

Represented by the GENERAL ELECTRIC CO. in Australasia, South Africa and Argentina



Even if Copper Wire were not so costly

the lighter weight, greater strength, superior elastic limit and lower maintenance cost of ARISTOS "COPPERWELD" (Copper Clad Steel) WIRE renders the use of this new wire decidedly more advantageous than copper for many service applications, such as:—

Trolley Wire; Strand; Tie Wires, Bare and Weatherproof; Telephone and Signal Lines; Ground Rods; Guy Wires; Transmission Systems; River Crossing Spans; Heavy Screen Mesh; Nails and Staples.

It Would Pay You to Use

ARISTOS

"COPPERWELD"

COPPER CLAD STEEL

WIRE

Western Sales Office

Steel Sales Corporation
Chicago, Illinois

Eastern Sales Office

Page Woven Wire Fence Company
30 Church Street
NEW YORK

Made from the product of
COPPER CLAD STEEL COMPANY, Pittsburgh, Pa.

Drawn and Sold Exclusively by

PAGE WOVEN WIRE FENCE COMPANY
MONESSEN, PA.

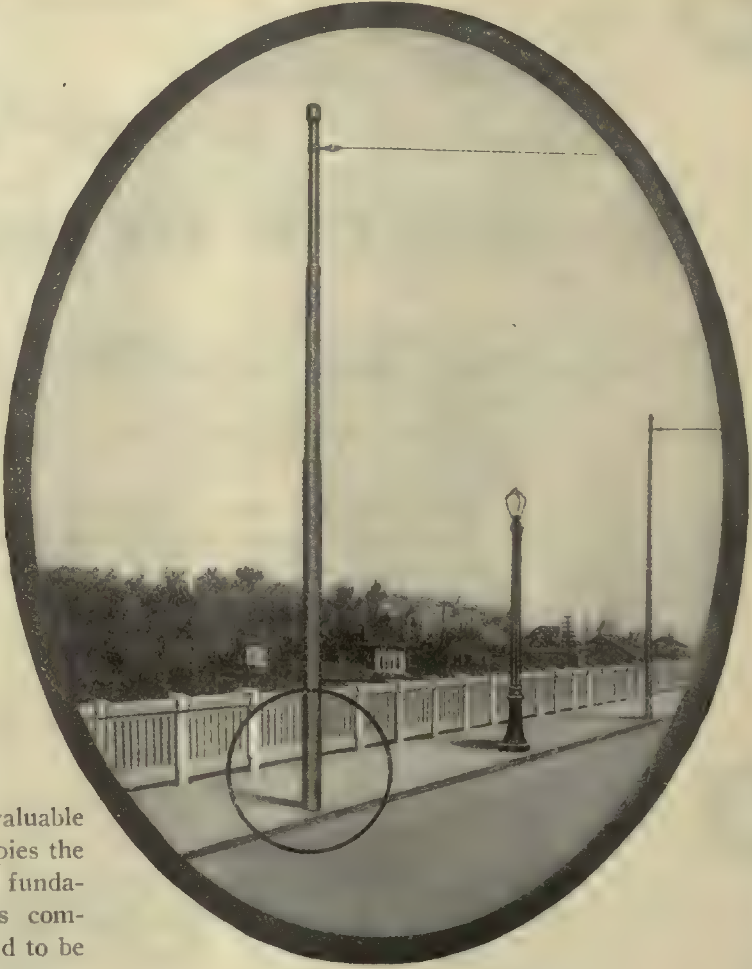
The ELRECO

Tubular Pole

is the Safest

and

Least Cumbersome



In cities where sidewalk space is valuable there is demand for the pole that occupies the smallest ground area. When this fundamental—the smallest ground area—is compounded by many other points conceded to be meritorious, you have the specifications written for Elreco Tubular Steel Poles.

Children cannot climb them.

Teamsters cannot readily use them for a hitching post.

They offer slight opportunity for hubs of vehicles to engage them in passing.

They offer unexcelled ease in painting.

They surpass every other form and shape of pole in uniformity and in their ability to withstand strains in all directions.

An Elreco Tubular Pole occupies but 34½ sq. in. at the ground line. For your own edification, compare these figures with those of poles other than Tubular.

These are but a few of the many reasons why Elreco Poles have been used so extensively by leading street railways throughout the world. In theory as well as in practice, these poles are conceded to be rightly designed. Likewise they are the safest and the most serviceable.

Let us have your inquiries for your present and future requirements.

ELRECO Tubular Poles

Combine

Lowest Cost
Lightest Weight
Least Maintenance
Greatest Adaptability

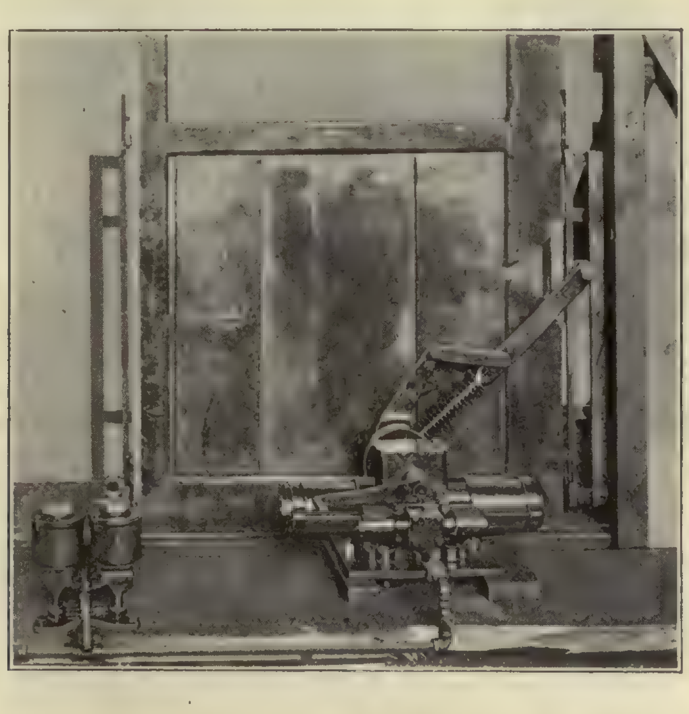
Electric Railway Equipment Co.

Cincinnati, Ohio
New York: 30 Church St.

National Pneumatic Control

Includes

Variable Door Timing Feature



The care given by the New York Municipal Railway Corporation toward combining speed and safety is illustrated by its door control specification which called for

A door *opening* period
of 1.5 seconds,
but a door *closing* period
of 2 seconds.

The slower door closing enables the belated passenger to avoid injurious contact with the door as he enters or leaves the car.

Still Greater Safety

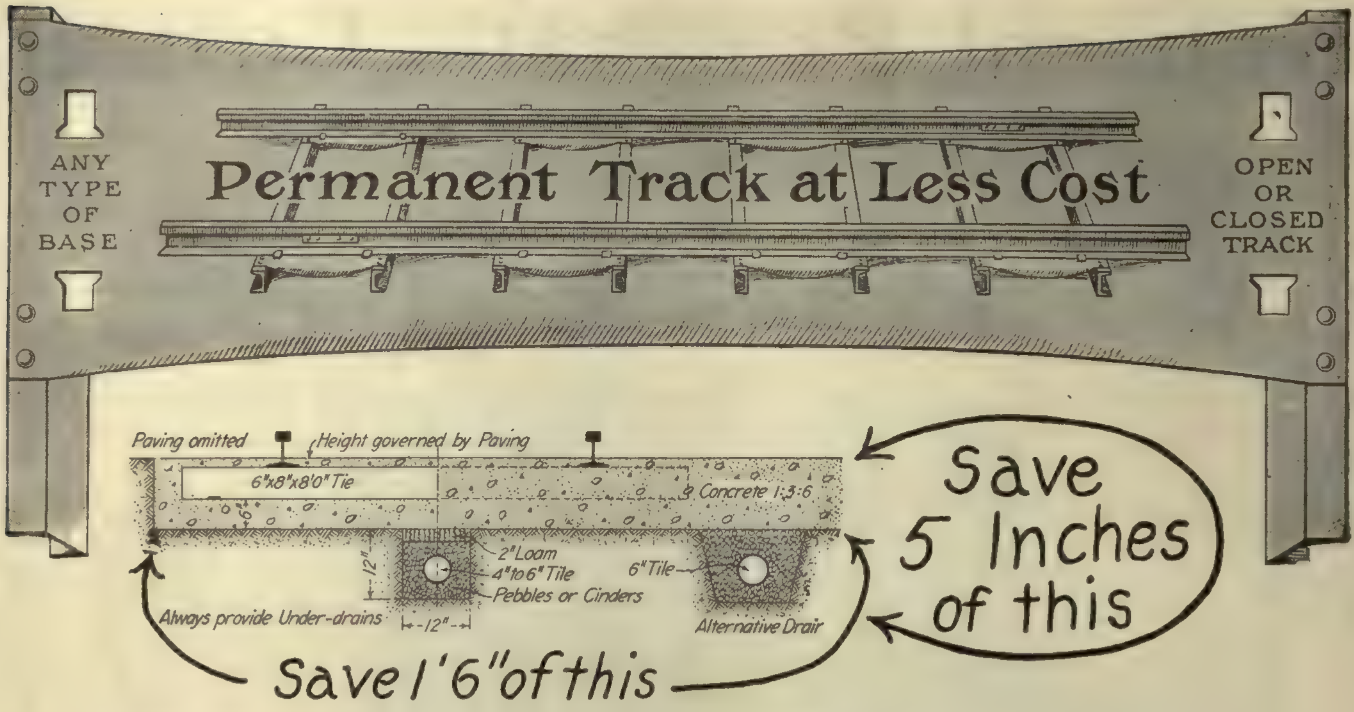
is assured by a flexible connection between the door engine and the door which prevents a passenger from being caught in a closing door as he can push the door back 5 in. during the greater part of the closing cycle.

The removal of any obstruction is followed by the normal closing of the door.

Have you seen how National Pneumatic Control is meeting these specifications?

NATIONAL PNEUMATIC COMPANY

50 Church St. New York
515 Laflin St. Chicago



International Steel Twin Ties

Do you know that the price of raw steel today is nearly triple the normal price? Do you know that despite this fact International Steel Twin Ties can compete with wood ties on a basis of first cost of paved track substructure?

Yes, can compete with credit on first cost—and always beat wood ties on ultimate cost.

Take the illustration above as an example. The use of International Ties would save 5 inches of concrete ballast and excavation. At the same time the width of the trench and concrete slab is reduced from 9 ft. to 7 ft. 6 in.

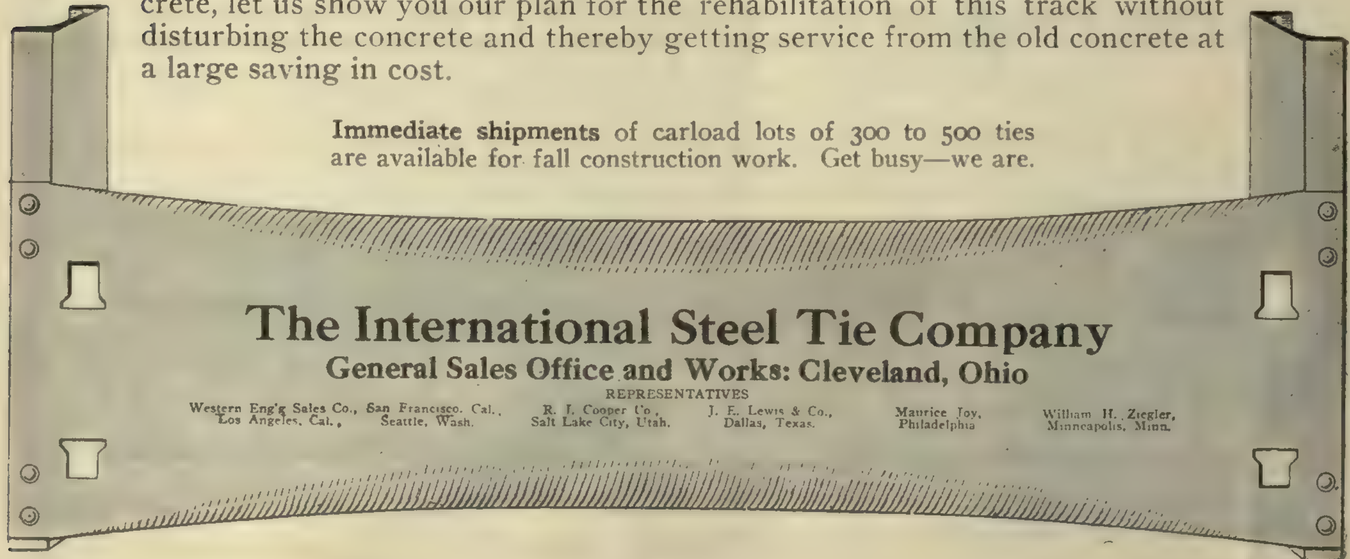
Then, too, International Steel Twin Ties mean the elimination of perishable track material and the substitution of lasting elements in track maintenance.

They reduce depreciation.

They prevent low joints and keep the track in good alignment.

If you are rebuilding old track that was laid with wooden ties in concrete, let us show you our plan for the rehabilitation of this track without disturbing the concrete and thereby getting service from the old concrete at a large saving in cost.

Immediate shipments of carload lots of 300 to 500 ties are available for fall construction work. Get busy—we are.

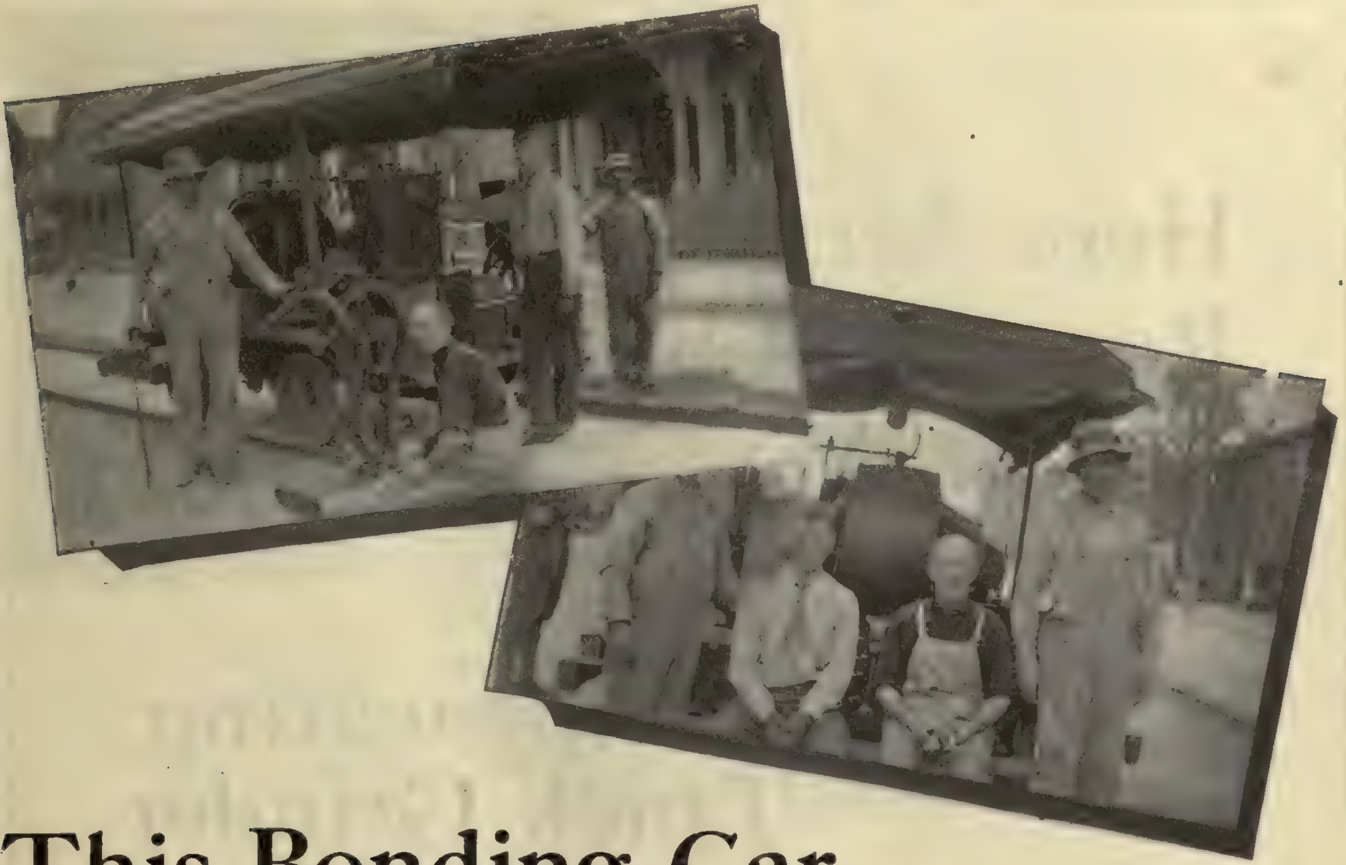


The International Steel Tie Company

General Sales Office and Works: Cleveland, Ohio

REPRESENTATIVES

Western Eng'g Sales Co., San Francisco, Cal., Los Angeles, Cal., Seattle, Wash.
R. I. Cooper Co., Salt Lake City, Utah.
J. E. Lewis & Co., Dallas, Texas.
Maurice Joy, Philadelphia
William H. Ziegler, Minneapolis, Minn.



This Bonding Car is installing Erico Bonds in Hazleton, Penn.

on the system of the Lehigh Traction Co.—without interference with schedules—without the least injury to bond or rail.

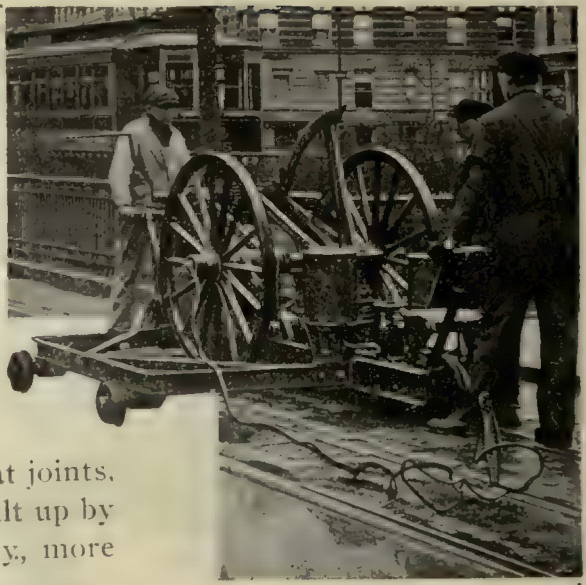
The Lehigh Traction Co. is getting a return circuit of permanently high conductivity at low cost.

They are also free from electrolysis troubles, because the Erico weld is equal in conductivity to the bond itself. The copper of the bond and the steel of the rail become one homogeneous unit which defies corrosion and the bond thief.

Close to half a million Erico Bonds are in service on the lines of only **one** big, progressive system out West. There must be a reason.

WRITE FOR DESCRIPTIVE LITERATURE

The Electric Railway Improvement Co.
Cleveland, Ohio



Here Are Reasons Why

the removal of rail corrugations, inequalities at joints, the smoothing of cupped rails after being built up by arc welding—can be done more economically, more efficiently, with the

Reciprocating Track Grinder

than with any other method

1st It has a straight grinding surface of 40 square inches.

2d The work is done by abrasive bricks which are operated back and forth with a rubbing motion —400 strokes per minute.

3d This Reciprocating Motion eliminates danger of gouging the rail or of grinding away too much of its wearing surface. *A mighty important factor.*

4th There are no fine adjustments for pressure—*no need to employ skilled mechanics* to operate this machine.

5th It grinds accurately, rapidly and economically, eliminating hammered joints or uneven new joints, corrugations and other inequalities in rails, thus prolonging life of track and saving wear and tear on rolling stock.

6th It does not tie-up traffic; the high wheel derailing truck enables the operators to move this grinder off and on the track in *less* than a minute.

Let us send you facts and figures showing what the Reciprocating Track Grinder has accomplished for many prominent urban railways.

Railway Track-work Company

30th and Walnut Sts., Philadelphia, Penn.

The Thermit Insert Weld

gives you

The Opportunity to Use the Best Alloy Rails

The ideal rail joint has been defined as one that will live as long as the rail.

Hence the rail should be selected first and the joint afterward; not vice versa.

The fact that alloy steel rails may be harder to drill for plate joints and uncertain for electric welding should not discourage their use.

Actual installations have proved that the Thermit Insert Weld is as successful on alloy or treated steels as it is on low-carbon open-hearth.

One reason is that the heat applied in Thermit welding is distributed over a wider area instead of being concentrated along certain lines or at certain spots. Thus the stresses due to temperature changes do not break down the fiber of the rail.

With any rail steel whatsoever, the Thermit Insert Weld is more than a junction; it is

A Continuation of the Rail Itself

GOLDSCHMIDT THERMIT CO.
WILLIAM C. CUNTZ, General Manager
90 WEST STREET, NEW YORK
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Duraduct

Reg. U. S. Pat. Off.

It's Right There and It's There Right

Duraduct is under fifty-four semi-convertible motor cars of the Boston Elevated Railway—

It carries the main cables of these cars from end to end in 105 feet of ¾-inch Duraduct.

You know Duraduct is a light single-wall conduit. But it's also flexible, waterproof, fireproof, easy to fish.

In fact Duraduct has all the good traits you want in conduit. Then why not send for some today.

SAMPLES ON REQUEST

TUBULAR WOVEN FABRIC CO.
MANUFACTURERS
PAWTUCKET, R. I.
A. HALL BERRY, General Sales Agent
97 Warren Street, New York **9 South Clinton Street, Chicago**
Distributors for Canada: NORTHERN ELECTRIC COMPANY, Ltd.

The Illinois Traction System's
"Safety First" One-Man Cars
are Equipped with

Rico Anti-Climbers

Naturally, the Illinois Traction people took care to make every provision for safety in operation.

The interlocking brake and door operating mechanism, with emergency opening of doors, are interesting features —and of even greater importance are the

RICO ANTI-CLIMBERS

which, at each end, **protect the cars against telescoping** —the worst form of accident.

Rico Anti-Climbers are standard on more than half the electric railways in North America. Ask us why.

RAILWAY IMPROVEMENT CO.
Executive Offices, 61 Broadway, New York
CHICAGO LOS ANGELES LONDON

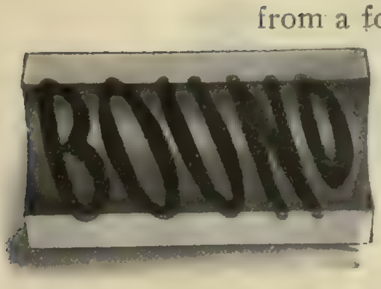
They Keep Los Angeles Cars Moving

—on schedule—free from annoying, expensive delays due to defective trolley wheel lubrication.

"BOUND BROOK"
TROLLEY WHEEL BUSHINGS

have a bearing surface composed alternately of high-grade bronze and finest graphite—this assures almost frictionless operation, even under high-speed service conditions.

A "Bound Brook" Bushing was recently removed from a four-inch trolley wheel after it had given 27,633 miles of service—the wheel was ready for the scrap-pile—but the bushing showed hardly a trace of wear.



All genuine graphited "Oil-less Bearings" have always been made at Bound Brook, N. J., in the United States of America, by the

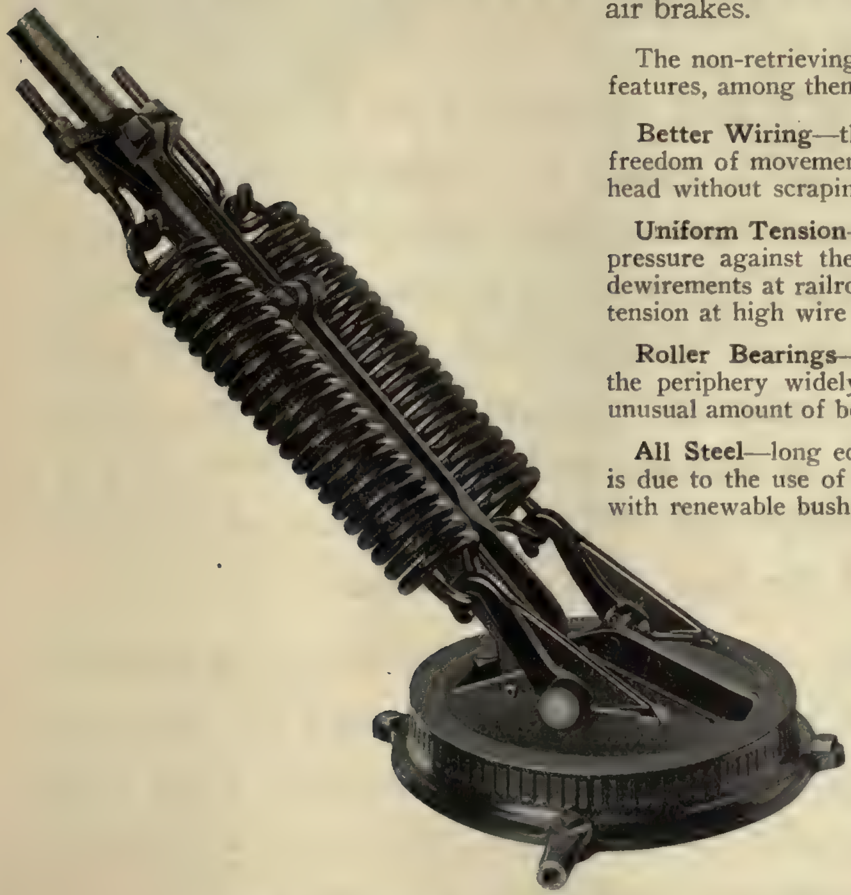
Trade Mark Reg. U. S. Pat. Off.

BOUND BROOK OIL-LESS BEARING CO.

Formerly Graphite Lubricating Company

Wasson's Famous Trolley Base

Now Available Without Retrieving Mechanism for Low Speed Service and for Cars Without Compressed Air



Wasson air retrieving bases have given such satisfactory and economical service that a definite call has come for the same base without the retrieving mechanism, for low speed cars or cars not having air brakes.

The non-retrieving type Wasson base is noted for superior features, among them being

Better Wiring—the anti-friction roller bearing gives entire freedom of movement, allowing the wheel to follow the overhead without scraping and wearing it.

Uniform Tension—the only base exerting exactly the same pressure against the wire irrespective of its height. Most dewirements at railroad crossings are due to weak trolley base tension at high wire points.

Roller Bearings—the 250 hardened steel rollers around the periphery widely distribute the load. They provide an unusual amount of bearing surface and current collecting area.

All Steel—long economical service given by Wasson bases is due to the use of high grade electro-cast steel throughout, with renewable bushings.

Moreover, if the pole on the Wasson city base dewires and tends to swing upwards and over, the main springs pull it back to a neutral position, thus decreasing damage which might result. With the Wasson retrieving base, the pole is forced to the car roof and locked there.

Folders describing Type NR City Base and Type RB (retrieving) will be sent on request.

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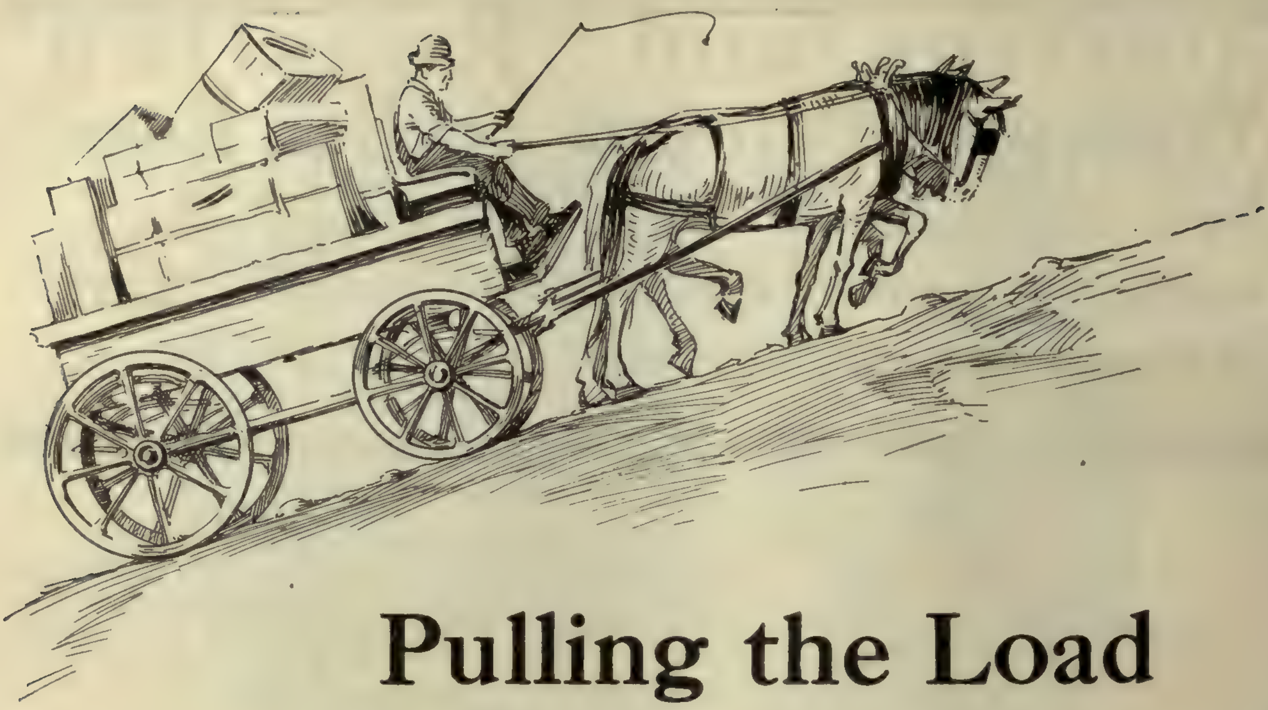
U. S. Metal & Mfg. Co., New York and Washington; C. F. Saenger & Co., Cleveland; Brown & Hall Supply Co., St. Louis; C. E. A. Carr Co., Toronto; W. M. McClintock, St. Paul; Alfred Connor, Denver; O. H. Davidson Equipment Co., Salt Lake City; F. F. Bodler, San Francisco; S. I, Walles, Los Angeles; W. F. McKenney, Portland, Ore.



Pulling the Load

Down hill and on the level, a load moves easily; but up a grade it is a hard pull. You wouldn't try to move a load up hill with the brakes set. But that is the practice in many powerhouses. Any ordinary oil answers the purpose fairly well when the engines are running light, but when the load comes on and the pull is up hill, then every bearing should turn with the minimum of friction —you need the best oil you can buy.

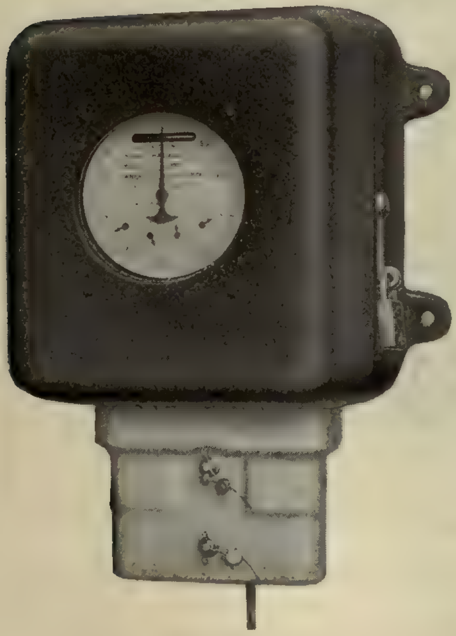
Specially compounded of the finest materials to meet the severest service, Galena Oils are unequalled for powerhouse lubrication. They are so exceptionally good that we stand back of them with a guarantee of service and cost.

Galena-Signal Oil Co.

Franklin, Pa.

Coasting and "Roasting"

How you can get More of One and Less of the Other



Perhaps it's the man. Perhaps it's undersize equipment. Perhaps it's both that are running up your power bill and causing "pull-ins" due to "roasted" armatures or fields, faulty brakes, flat wheels, etc.

ECONOMY
SANGAMO
BUILT LIKE A WATCH
METERS

will spot the weak points in your equipment and your distribution system. They will spot the poor motorman and show you where to direct your efforts to conserve the company's energy. They will stimulate the good motorman to become a better motorman. They will enable you to render a better service to the public.

Economy Meters cannot fail to do all these things and more for you when backed by the Sangamo Economy Campaign. We have a vast fund of information based on the experience of other roads embodied in the campaign. Ask us about it and how one company operates its ECONOMY Meters
at a cost of 1c per day per motorman.

Sangamo Electric Company
Springfield, Illinois
Specialists in Meters for Every Electrical Need

H-B Life Guard
Saves Three Children at Once

"The car on the 7:00 p.m. journey, Ingrow to Utley, was passing Rawling Street and was traveling from five to six miles an hour last night, when three children came tobogganing down the street and across the roadway right into the car. All three children were caught by the Lifeguard, which just shows how efficient the Lifeguard is."—(Official Account.)

The New York Public Service Commission reports similarly remarkable rescues.

The Chicago Public Service Commission reports 96% efficiency.

Schenectady tests gave the H.B. highest award. H.B. Life Guards are in service the world over—in England, France, Belgium, Egypt, China, South Africa, Japan, Australia, Brazil, Argentine, Chili—and from all installations come reports of safe, sure service under all operating conditions. Is **your** road H.B.-protected?

The Consolidated Car Fender Co.
Providence, R. I.
General Sales Agents, Wendell & Mac Duffie Co. 61 Broadway, N. Y.

HESS-BRIGHT vs. PLAIN BEARINGS IN ENERGY CONSUMPTION

The actual percentages in energy saved by Hess-Bright Ball Bearings will never be exactly alike because of variations in the number of stops, the ability of the motorman, the condition of the track, etc.

But when figures like the following are obtained in test after test, it is clear that Hess-Bright Journal Ball Bearings can produce very appreciable savings. Here is one parallel from an article published in the Electric Railway Journal for Dec. 25, 1915:

Car 721—New York State Railways—Rochester Lines

Weight empty 48,600 lb.—loaded 59,850 lb.

Date of Test Plain	Plain Bearings—Kw-hr. per Car Mile	Hess-Bright Bearings Kw-hr. per Car Mile	Date of Test Hess-Bright
May 11, 1911	3.40	2.80	May 25, 1911
Dec. 12, 1911	3.50	2.92	Oct. 6, 1911
Dec. 15, 1911	3.16	2.84	Nov. 27, 1911
Dec. 18, 1911	3.26	2.88	Nov. 28, 1911
Average	3.33	2.86	

Recent tests by the New York State Railways—Rochester Lines indicate that this saving of approximately 14 per cent is being maintained today.

Hess-Bright Ball Bearings insure the consistent and permanent saving of energy.

TRADE MARK
HB DWF
HESS-BRIGHT
THE INIMITABLE BEARING

THE HESS-BRIGHT MANUFACTURING COMPANY
FRONT ST. & ERIE AVE., PHILADELPHIA, PA.

HESS-BRIGHT CONRAD PATENTS ARE THOROUGHLY ADJUDICATED

COLUMBIA

An Echo of the Convention

Those of you who were at the Convention this October will recall that we kept an open house for every railway man who was foot-weary from the tramp, tramp, tramp from one exhibit to another.

The same hospitality that you found at the Columbia booth will be yours should you want to visit our works to see what extensive facilities we have to meet your needs in these electric railway products.

Other Columbia-Made specialties are:

TOOLS

Armature and axle straighteners
Armature buggies and stands
Babbitting molds
Banding and heading machines
Car replacers
Coil taping machines for armature leads
Coil winding machines
Pinion pullers
Pit jacks
Signal or target switches
Tension stands

CAR EQUIPMENT

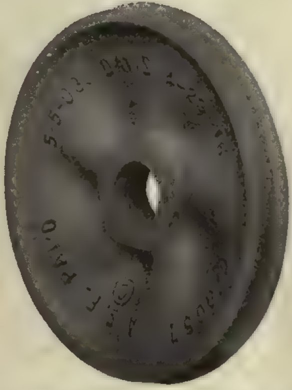
Armature and field coils
Brush-holders and brush-holder springs
Brake, door and other handles
Brake forgings, rigging, etc.
Car trimmings
Commutators
Controller handles
Forgings of all kinds
Gear cases (steel or mall. iron)
Grid resistors
Third-rail contact shoes and accessories
Trolley poles (steel) and wheels

Columbia Machine Works & Malleable Iron Co.

Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

W. R. Kerschner Co. Inc., New York   Holden & White, Chicago   F. F. Bodler, San Francisco

The Most Important Step in the Making of a Davis Steel Wheel



Only perfect molds are poured. Each mold is placed upon a table and revolved rapidly. The ladle containing molten steel tapped from an open hearth furnace is placed directly over the mold and the metal passed into the gate in the center. Powdered ferro-manganese is injected, through the small nozzle, into the first metal entering the mold and combines with it to make the manganese steel. The centrifugal action of the revolving mold immediately throws this manganese steel to the rim, where it forms a hard, tough, wear-resisting manganese steel tread and flange. As the remainder of the metal entering the mold is not treated with manganese, there is a gradual blending of the manganese steel in the tread and flange into soft, ductile, carbon steel, which forms the plate and hub.

Here is an operation which insures both the "one-wear" tread and the ductile plate and hub section. Slid-flats are greatly reduced and maximum safety and economy are insured in every class of service.

You ought to know more about the economy of Davis Steel Wheels. Write for full particulars.

DAVIS
Steel Wheels

The steel wheel with the one-wear tread.

No turning—no trouble with motor clearances.

A hard, tough manganese tread and flange.

A soft, ductile steel plate and hub.

Reduction in slid-flats.

A 20% saving in weight.

Minimum maintenance cost.

Strength — safety — economy.

The steel wheel backed by years of successful service.

You are not expected to adjust your conditions to meet our product. Davis Steel Wheels are made to meet A.E.R.A. specifications and your service requirements.

Write.

American Steel Foundries

1100 McCORMICK BUILDING CHICAGO, ILL

COLLIER SERVICE

YOU
are cordially
INVITED
to INSPECT
our
NEW
CENTRAL
PLANT

CANDLER
BUILDING

220 W. 42nd. St.
NEW YORK CITY

CAR
ADVERTISING
ALMOST
EVERYWHERE

Barron G. Collier
INCORPORATED

The Differential Electric Dumping Car

Has Earned $100 Per Day

—it may earn more or less than this amount for you—it depends upon the work you have for it. But it is certain to effect big savings for you—

Because the Differential dumps its load so far from the track that wasteful shoveling is unnecessary, and passenger car schedules are not in the least disturbed.

Because even when upright the Differential's maximum height of side boards is 5 ft. 4⅛ in., making loading quick and easy for the shovelers.

Because the Differential can be loaded even in its tilted position when its lower side is only 2 ft. 6 in. above the rail.

Write us concerning other features of a dump car that *makes* money instead of *wasting* money.

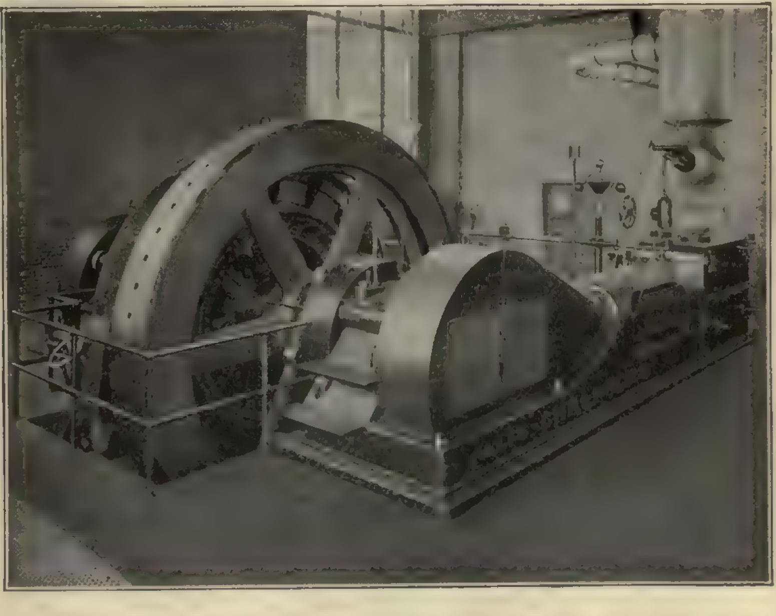
Differential Car Co.
141 BROADWAY, NEW YORK
Works: Nashville, Tenn.
H. FORT FLOWERS, Pres. & Gen. Mgr.

The Differential Car dumps the load clear of the track. No costly shoveling. No delay to schedules.

WE HAVE BUILT 6,000,000 HORSE POWER

STEAM ENGINES
GAS ENGINES
OIL ENGINES

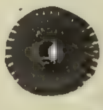
We also build
Steam Turbine
Condensors
Generators
Motors, Etc.



Cross-Compound Direct-Connected Corliss Engine Unit.

Our 40 years' experience is at your service

ALLIS-CHALMERS MANUFACTURING CO.
MILWAUKEE, WIS., U. S. A.



Catskill

Heat-Treated

Gears and Pinions

Star Brand

A new type of gear and pinion especially prepared and heat-treated by a process of our own. The finest quality of rolled steel blanks are used for material.

Ask us for the complete Data

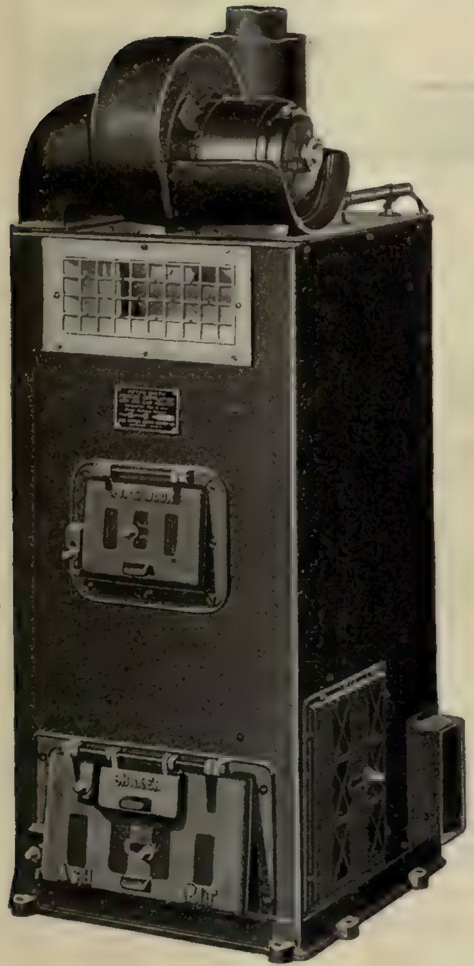
The gears and pinions are cut true to pitch, and next are put through a special heat-treating process which gives them exceptional tensile strength. This process insures the gear and pinion a wearability of three to five times that of the ordinary gear and pinion. Prices are reasonable, and when durability is considered—very low indeed.

W. R. Kerschner Co., Inc.

50 Church Street, New York

Peter Smith

Ventilation Efficiency Doesn't Depend on Car Speed



No matter whether standing still, or hitting a 60-mile clip, both heat and ventilation are distributed uniformly throughout the car by the

Peter Smith
Forced Ventilation Hot Air Car Heater

This is because the heated air is delivered into the car every three feet along the floor level—325 cu. ft. of it every minute.

The circulation is positive—the motor-driven blower attends to that.

And the passengers are comfortable—a long step toward pleasant public relations.

The cost? 28 cents per 18-hour day.

Better look into this effective, positive, economical method of car heating and ventilation.

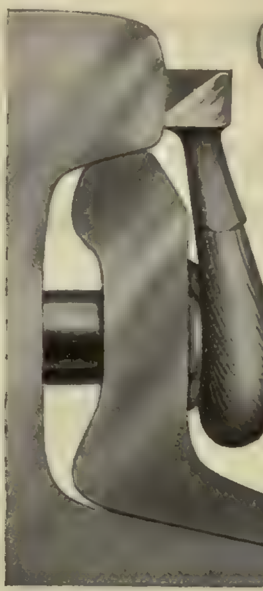
The Peter Smith Heater Co.
Detroit, Mich.

Heater Specialists for Thirty-five Years

PS HEATERS

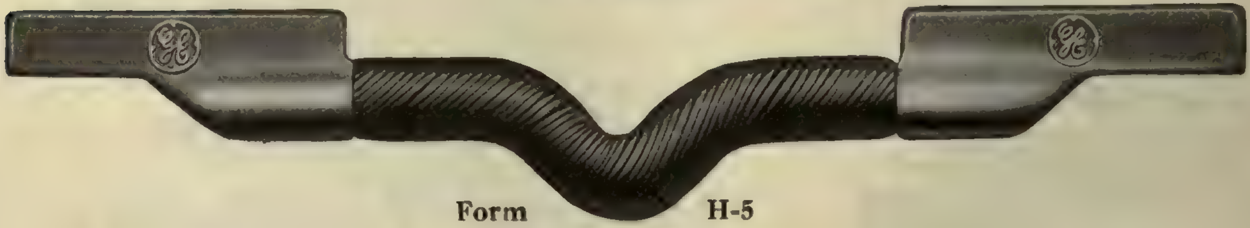
PS HEATERS

Form H-3



Cross Section of Rail
Showing Form H
Bond Installed

Form H-1



Form H-5

G-E Form H Railbonds

(for application with acetylene flame)

The G-E Form H bonds have especially designed terminals suitable for application by means of the oxy-acetylene welding torch. The top surface of the terminal is sloped downward toward the surface which rests against the rail thus forming a recess for building up the weld. Ventilating ducts are provided at the bottom of this recess permitting a weld extending to the lowest point. This means a weld of large area and minimum leverage in case of attempt to pry the bond from the rail.

Consult the railbond specialist at our nearest office

General Electric Company

General Office: Schenectady, N. Y.

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For Texas, Oklahoma and Arizona business refer to Southwest General Electric Company (formerly Hobson Electric Co.), Dallas, El Paso Houston and Oklahoma City. For Canadian business refer to Canadian General Electric Company. Ltd., Toronto, Ont.

6153

Electric Railway Journal

Published by the McGraw Publishing Company Inc.
Consolidation of STREET RAILWAY JOURNAL AND ELECTRIC RAILWAY REVIEW

Vol. XLVIII NEW YORK, SATURDAY, NOVEMBER 4, 1916 No. 19

SETTING BUSINESS MEN TO THINKING

The appointment of a special committee by the Portland (Ore.) Chamber of Commerce to consider the financial plight of the local railway shows that the recent striking address of C. M. Clark in that city, as noted in last week's issue, has already set the business men of the community to thinking. While this does not mean an immediate assurance of that public fairness toward invested capital which is so needed by the Portland company and other Western railways, it is a marked step forward. We know of no better way to overcome that lack of interest in vested rights which is causing such concern to Eastern investors than by securing a better understanding between the investment banker and the local business man. On the one hand is the man who can fully foresee the disastrous results to the community of not carrying out its contractual obligation to protect the capital dedicated to public service, and on the other is the man who from his daily experience can appreciate the bearing of contractual integrity upon credit and by his influence can gradually bring the public to a better realization of its responsibility for utility development. From the ethical standpoint of duty as well as the practical standpoint of expediency the public ought to be honest with utility investments, but a new publicity is needed to make it understand fully its moral obligation and the common interests of utility and community. In this publicity the investment banker and the business man can be most efficient allies, and this phase of public-relations work should not be overlooked.

STANDARDIZING SMALL PURCHASES

Much emphasis is laid by H. B. Twyford, in an article published this week, on proper and uniform specifications and descriptions for materials and supplies. Without a doubt this is a matter to be carefully watched by all purchasing agents, particularly with reference to the many small articles that are bought. As Mr. Twyford states, the work of the purchasing agent in connection with heavy and highly technical purchases is largely that of specializing on prices and delivery, for the specifications to be followed are furnished by the engineering department. In the case of many small articles and miscellaneous materials, however, no standard specifications or descriptions are formulated in any department, with the result that the various parties concerned in making a requisition and order often seem widely apart in their statements of what they want. Where this condition obtains, the purchasing department has the opportunity to initiate a real reform by originating and putting into force uniform rules throughout the whole organization. The plan suggested by Mr. Twyford of having suitable sketches with standard specifications or descriptions placed on the purchase-order record and the storeroom record is one that would, if put into practice, result in intelligent purchasing work and save much confusion and delay, perhaps at times of emergency. Moreover, competitive bidding, the general requisite of efficient purchasing, loses its value if based upon any misconceptions of the article desired, and the desire to avoid these would alone warrant the use of such a plan as described.

SUPERVISING SECURITY ISSUES

The opinion of the Illinois Public Service Commission on the consolidation of the Illinois Northern Utilities Company, the Freeport Railway & Light Company and the Tri-County Light & Power Company, abstracted elsewhere in this issue, has to do with a case relatively insignificant from the point of view of national utility financing. It is, however, of great value in outlining the proper functions of the commission in all security issuance cases under the Illinois law, and also in laying down a general policy along this line that ought to be adopted by all public service commissions. In its broadest aspects, the decision relates to commission regulation of the old securities of consolidated companies, the new security issues of existing utilities whether consolidated or not, and the security issues of entirely new companies. In the first case the commission does not at all feel called upon to make a physical valuation of the consolidated companies, when the new consolidated stock does not exceed the sum of the capital stocks of the constituent companies, for the new stock is by nature really a reissue of old securities, with which the commission is not concerned for the purpose of correcting any evils of former years. Nevertheless, to take up the two other cases, the commission intends to see that new issues of existing utilities represent actual property (thereby in cases of over-capitalization gradually raising the general property-security ratio), and that every $1 of securities of entirely new companies stands for $1 of actual property.

POLICY WISELY EXPLAINED

The sanity of the platform embodied in these three cases is hardly open to question. Undoubtedly, as the commission states, a sudden upheaval of utility financing in Illinois would result if that body were to attempt to make all outstanding securities conform to present-day business ethics. Yet, to disregard this point of expediency, the commission on the grounds of simple equity to existing security holders, maintains that it should not now constitute itself a moral censor of past practices involved in the issuance of securities under laws then publicly sanctioned. The dead past should be allowed to bury its dead. The commission is concerned with the task of enforcing a unity ratio of property to securities only in connection with new securities, which is exactly as it should be. In order, however, to give wider publicity to its security-authorizing functions, the commission in the decision cited has adopted the interesting expedient of requiring on each stock certificate of the consolidated company a recital to the effect that the authorization of the consolidated stock does not import that it has passed upon the value of the property. This is simply one phase of a general warning to investors that, later in the decision itself, finds expression in the words: "An approval by this commission of securities of any character whatsoever is not a guarantee on the part of the State as to the value of tangible property, as to an annual rate of return or as to the success of the utility's management." In buying utility securities the investor must exercise the same business judgment that he would use in buying the securities of any other sort of business. In other words, he must make the necessary investigation to determine to his own satisfaction how new securities authorized by the commission and old securities neither validated nor approved by it, will be mutually affected so as to fix the real value and future possibilities of the company in question as an investment. It would be a wise step if all commissions would explain to the public as clearly as the young Illinois body has done, that they are not banking agencies of any sort, for it would be a sorry day for regulation if the public in general should get the idea that the commissions are responsible for the success or failure of its investments.

CO-OPERATION WITH LABOR

Of the many experiments in the management of labor which have been inaugurated in recent years, few have demonstrated their practicability as conclusively as the co-operative plan instituted by the Philadelphia Rapid Transit Company in 1911. The details of the plan and its results in operation are described in an article appearing in this issue. The co-operative plan has stood the most severe test to which it could be subjected. A strike recently called was a complete failure. Not a run was missed. Less than 5 per cent of the men answered the strike call. Philadelphia was the scene of serious street railway strikes in 1909 and 1910. The co-operative plan in six years has worked a complete transformation in the relations of the men to the company, and out of the better feeling thus engendered has grown a loyalty which made the recent strike impossible of success.

Operating officials of many other properties can profitably study the Philadelphia plan. Stripped of details, its essential feature is a joint committee, composed of representatives elected by the men meeting with the division superintendents of the company. This committee passes upon a wide range of questions not affecting matters of policy. The success of the plan is due, in part, to the type of operating official working under it, but it possesses in addition the great advantage of furnishing a medium by which the minor discomforts and complaints of the men may be threshed out with the officials of the company. Out of a multitude of these petty annoyances, most of which in the experience of Philadelphia can be readily adjusted, is bred the spirit of aloofness between employer and employee which furnishes the opportunity for the strike organizer. The additional advantage is secured that it brings an understanding of the difficulties of management directly to the employee. It is an easy thing to criticise some method or practice, but if the man who thus criticises is placed in a position where he is able to remove the difficulty if he can recommend a better plan, he sometimes finds that no other plan is practicable.

It would not be contended that the co-operative plan is the best solution of the labor problem on all systems. It has been an emphatic success, but it does not follow that it would meet the conditions in every community. In many respects the co-operative committee does not differ from the grievance committee on some systems. The Philadelphia officials dislike the phrase "grievance committee." They argue that it proceeds on a false psychological basis. Matters should be settled before they become grievances. The basis to be sought is one of co-operation between the company and its employees in the fullest sense of that term.

One of the most interesting features of the co-operative plan is the creation of a wage fund, to which 22 per cent of the gross earnings is appropriated and from which operating wages are paid. As the fund increases wages are advanced. The men are made, in effect, partners sharing in the gross receipts of the company. The percentage was fixed upon the basis of the amount which the men were receiving at the time the plan was put in operation. Through economies in operating methods, earnings per car-hour have been increased some 21 per cent, with a proportionate advance in wages. The success of the co-operative plan is due in a large measure to its ability to provide an advance in wages.

In securing operating economies certain adjustments of working conditions, frequently distasteful to labor, were necessary. Swing runs were substituted in part for the universal straight runs which had theretofore prevailed. Divisions were consolidated, with the result that many men with preferred runs had to take others of less desirability. These and many other changes of a like character were effected without difficulty because of the fact that advances in wages depended upon such improvements, and this could always be kept before the men.

Whether the co-operative plan will be as successful in periods of stationary or declining earnings, when wages cannot be advanced, and whether the labor situation in Philadelphia will always remain as satisfactory as at present, are matters which only the future can decide. Five years of experience, however, can leave no doubt of the great advantages of this plan as applied during that time in Philadelphia.

Every Employee a Publicity Representative

This Conductor Was Never Taught to Cultivate Good Public Relations

WHAT determines a purchaser's opinion of what he buys and of the concern he buys from?

It is the quality of the merchandise and the treatment received from the salesman.

The platform men of an electric railway are so many retail salesmen of transportation. This isn't merely a figure of speech; it is a PLAIN FACT.

And the platform man can make a railway liked or disliked, just as any other salesman can make friends or enemies for his concern.

A few years ago an analysis of about 800 complaints on an eastern electric railway showed that nearly 75 per cent of them were due to incivility or worse on the part of platform men.

It is evident from the nature of the electric railway business that motormen and conductors can make an appalling number of enemies for a road.

Fortunately it is just as true that they have it in their power to make a great many friends.

But the management must educate them in the business of friend-making; a few cut-and-dried paragraphs in the rule book will not do it.

Every successful merchant has it clearly in his mind and effectively impresses it upon his employees that the making of satisfied customers is Rule No. 1.

For some reason neither managements nor men of electric railways work very hard toward this end, though the policy of the successful merchant applies as well to the railroad as to the department store.

EVERY EMPLOYEE of a railway, especially the ones immediately in contact with the public, IS A POTENTIAL PUBLICITY MAN.

Good, agreeable treatment of the individual car rider will go a long way toward making a road popular.

Professions of good intent are all right, but they do not find ready lodgment in the mind of a man rankling from a row with an impudent conductor.

A passenger left standing in the rain by an unobservant motorman should be able to give an impartial hearing to a plea for fair adjustment of a franchise controversy, but, being human, he doesn't do it. It ought to be a rule on every electric railroad that in any difference of opinion between passengers and subordinate employees THE PASSENGER IS ALWAYS RIGHT.

For what shall it profit a railroad to collect a 5-cent fare from a man who thinks he has already paid, and thereby incur $17 worth of ill-will?

Here is a not-often-reckoned factor in the bringing about of good public relations:

The railroad educates itself and its men at the same time it is educating the public.

Where a road is endeavoring by a frank policy of publicity to set itself right with the public, its employees are led inevitably to adopt the same attitude.

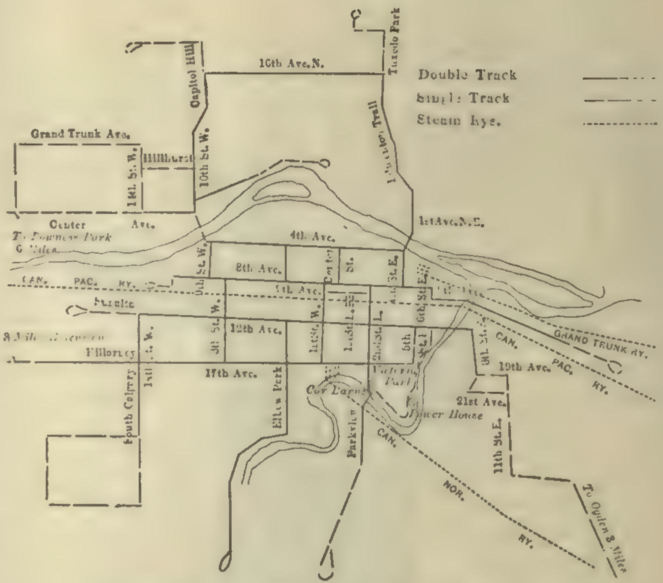
There are 99 reasons why every public service corporation should adopt a policy of publicity, but the effect of such a policy upon the men within these organizations is ALONE reason enough.

War Checks the Growth of Calgary Street Railway

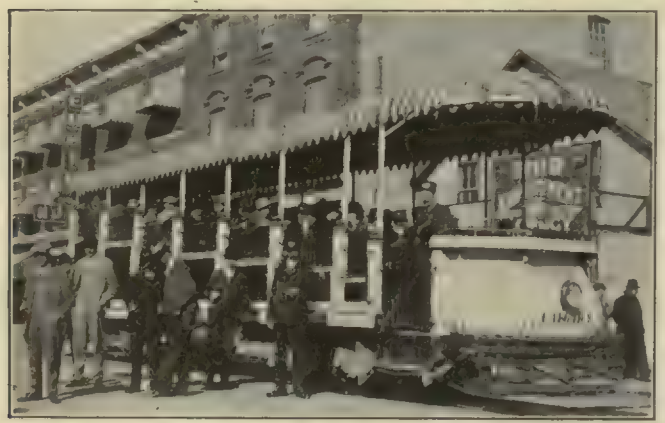
Canadian Railway Effects Economies by Using One-Man Cars and Reducing Schedules—Wages of Employees Have Not Been Cut.

AFTER the city of Calgary, Alberta, had come to the conclusion that a street railway system was a necessity there was a long struggle between advocates of private ownership and adherents of a municipal system, in which the latter won. Construction work was begun in September, 1908, and was pushed along so rapidly that within a year there were 16½ miles of track and twelve cars in operation. But so rapid was the growth of the city, that during the next five years it was necessary continually to extend the lines and to increase the number of cars, so that just prior to the commencement of the war there were 74 miles of track and a total of ninety-eight cars, comprising seventy-eight passenger motor cars, six trailers, eight work cars, three sprinklers, a large power construction car, an observation car and a sweeper. Table I shows how the railway has kept pace with the growth of the city.

The accompanying map of the city shows the layout of tracks which comprises twelve main routes. On Eighth Avenue, the main business street, a one-minute headway is maintained. The other streets, located in the central part of the city, have two-minute to five-minute service. The belt line which encircles the business section and the better class, centrally located, residential sections operates on a headway of seven and one-half minutes. The routes leading to the suburbs are operated on headways of from ten minutes to thirty minutes, depending on the distance covered and the population served.



CALGARY STREET RAILWAY—MAP OF CAR LINES



CALGARY STREET RAILWAY—SIGHTSEEING CAR

The general offices, carhouse, repair shop and storage yards of the system occupy a site 500 ft. long and 220 ft. deep which fronts on Second Street East, at the southern limits of the city. The track plan, page

TABLE I—SHOWING THE GROWTH OF CALGARY, ALTA., AND ITS RAILWAY SYSTEM

Date	Estimated Population	Cars Operated	Miles of Track	Men Employed
July 5, 1909	35,000	2	3.0	16
July 1, 1910	50,000	15	16.5	62
July 1, 1911	55,000	22	26.5	102
July 1, 1912	70,000	48	54.0	246
July 1, 1913	90,000	65	70.5	348
July 1, 1914	90,000	65	71.5	322
July 1, 1915	75,000	60	71.5	272
July 1, 1916	60,000	60	74.0	263

CALGARY STREET RAILWAY—EXTERIOR VIEW OF OFFICE AND CARHOUSE

CALGARY STREET RAILWAY—STRING OF MOTOR CAR AND TRAILERS

964, shows the general layout of repair pits, shops and offices on this site. On the second floor over the offices the employees' club rooms are located, and there is an assembly and dance hall over the paint shop.

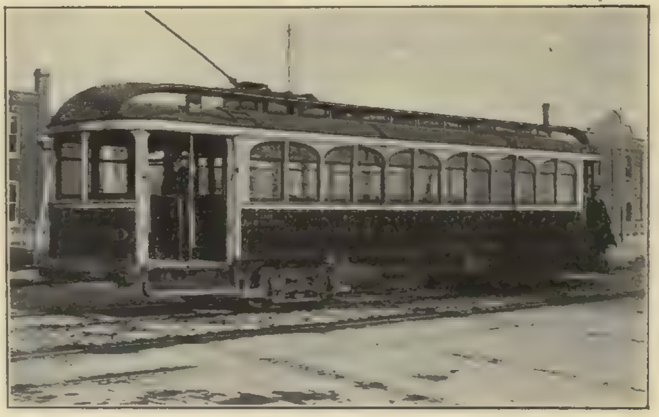
About one-half of the total track mileage of the system is on paved streets. Contrary to the usual practice which has descended from the days of the horse car, the Calgary Street Railway has to assume no responsibility for the care of the pavement between the tracks except for the sub-base, which consists of 4 in. of concrete. The track work consists of 60-lb. and 80-lb. Lorain Steel Company rails, with 6-in. and 7-in. sections, which are laid on ties, spaced 4 ft. apart and thoroughly grouted in cement. The rails are bonded with double compressed bonds. All special work is of manganese steel supplied by the United Steel Company and Hadfields, Manchester, England. Overhead wires are used exclusively except in the business sections of the city where the feeders and connections between the main power stations are placed underground.

The Calgary railway, having no power plant of its own, purchases all the power which it consumes from the city at the rate of 1½ cents per kilowatt-hour. The system uses between 20,000 kw.-hr. and 30,000 kw.-hr. per day.

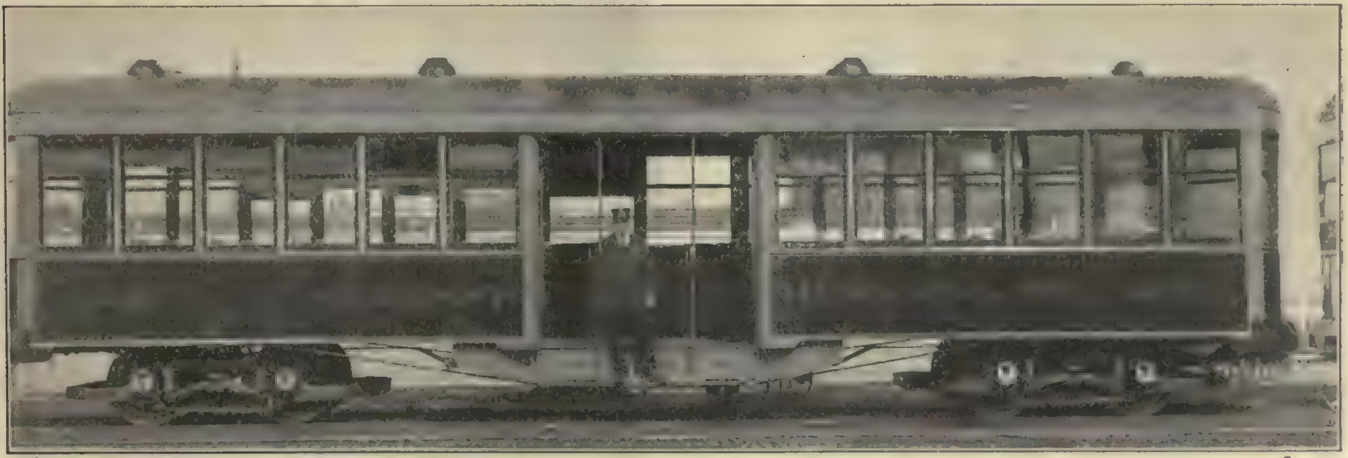
An unusual feature of the car equipment is the "Seeing Calgary" car which is shown in one of the accompanying illustrations. The car is 46 ft. long with the seats arranged in tiers. The panels on the side of the car are beveled plate-glass mirrors, and the fittings are nickel-plated. In the summer the car makes hourly trips over all the interesting routes of the city, the fare charged being 25 cents. It is also frequently used by the city in entertaining official visitors. This car, built by the Preston (Ont.) Car Company, at a cost of $7,500, has proved to be a good investment, earning as much as $124 per nine-hour day during the prosperous times.

The motor cars of the system, which are of the pay-as-you-enter type, were built by the Ottawa Car Company and the Preston Car Company, both Canadian concerns. They include two sizes of double-truck cars. The larger car seats forty-eight passengers and is 46 ft. 6 in. long; the smaller one seats forty passengers and is 41 ft. 6 in. in length. There are also single-truck cars which seat twenty-eight passengers each. There are six trail cars built by The J. G. Brill Company of Philadelphia, Pa. These are of center-door type 41 ft. 6 in. long with a seating capacity of sixty passengers.

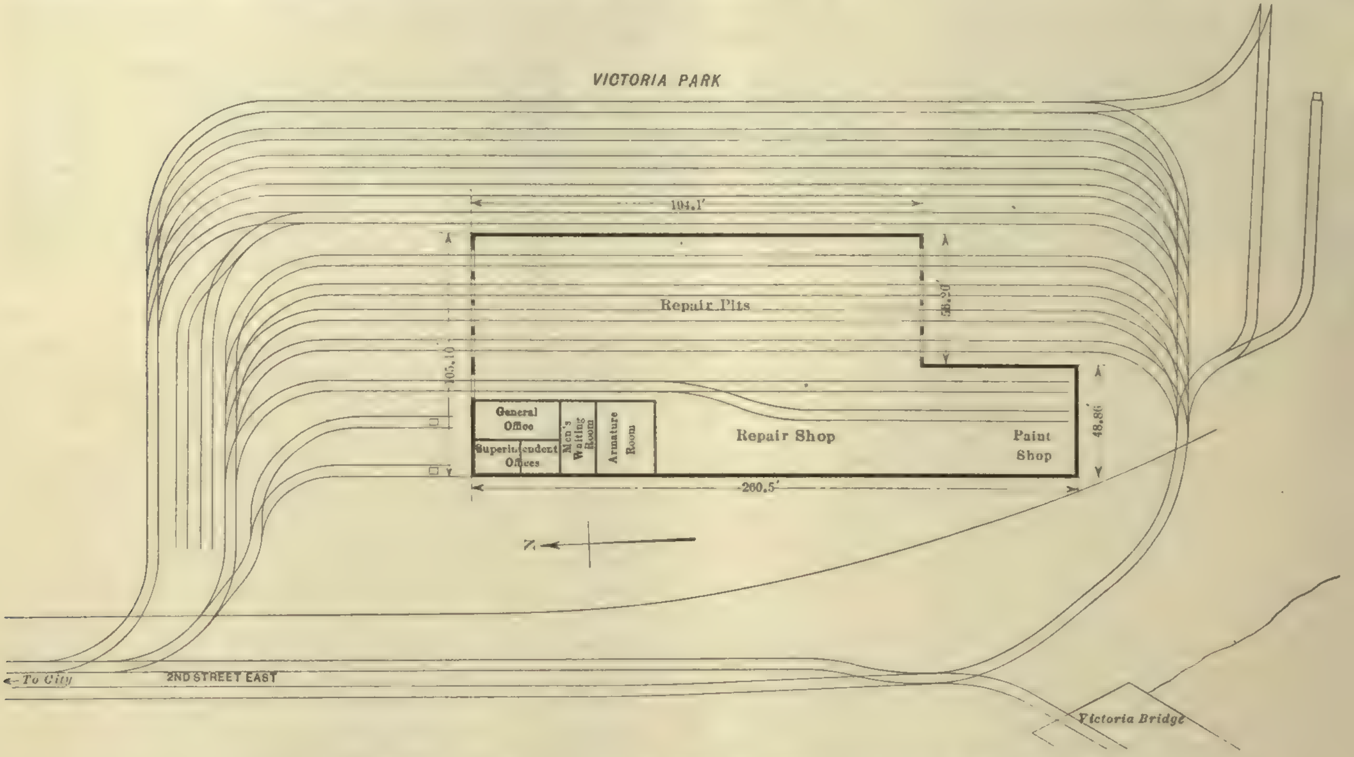
In order to effect economies, made necessary by the



CALGARY STREET RAILWAY—TYPE OF MOTOR CAR USED



CALGARY STREET RAILWAY—VIEW OF CENTER-DOOR TRAIL CAR war and the subsequent depression, some of the double-end motor cars have been altered for one-man operation. In making the alterations the rear door was permanently closed and the coin box was moved to the front of the car. The rear vestibule was made into a smoking compartment seating ten passengers. This is known as the "smoking parlor" and is greatly appreciated by the patrons. The one-man cars are being operated on the lines running to the suburbs and on other routes which do not run primarily in the business districts. They have been willingly accepted by the public, and the operation is said to be very satisfactory. The fact that a large proportion of the passengers use tickets facilitates the fare collection. The most competent and best-paid trainmen on the system are employed on the one-man cars.



CALGARY STREET RAILWAY—PLAN OF OFFICES, REPAIR SHOP AND STORAGE YARD

There is a marked contrast between the fares established on this system and those charged by most of the privately-owned lines. There are no passes issued on the Calgary system, but five classes of special rate tickets are sold. School tickets, sold at the rate of ten for 25 cents, may be used by children at any time, and by adults traveling to and from school. Work tickets, at eight for 25 cents, may be used by all passengers from 6 a. m. to 8 a. m. and from 5 p. m. to 7 p. m. Ordinary tickets, of which twenty-five in book form are sold for $1, are good at any time. Twice a week on market days these tickets can be purchased singly for trips to and from the public market. The civic employees have tickets sold in pads of thirty for $1, which are paid for by the departments whose employees use them. All these tickets are good for transfers to any part of the city.

Naturally when the European war broke out the result was reflected in the operation of the railway. Expenses had to be curtailed, the number of cars operated were reduced, some of the men were laid off, and other economies were resorted to, including the operation of the one-man cars above described. During the summer time practically all of the motor cars are operated with but two 40-hp. motors per car, thus saving a large amount of power. Four motors are necessary in the winter, however, on account of the increased traffic and snow resistance. By cutting out the insurance on all the cars of the system and supplying each with Pyrene fire extinguishers, a further saving of $600 per year has been made. The wages of the men have not been reduced.

Table II gives briefly the operating data for the three years ending June 30, 1916, and while it shows the effects of the war on the railway, it also indicates that the reduction in the volume of traffic has not been as great in 1916 as in 1915. It is hoped therefore that the greatest depression has been reached and that an improvement will shortly take place.

TABLE II—SHOWING THE EFFECT OF THE WAR ON THE RAILWAY OPERATION

	1914	1915	1916
Total passengers carried	24,037,860	19,073,378	17,486,234
Passenger car-miles	3,213,132	2,819,804	2,524,860
Freight, mail and express car-miles	500	2,895	2,550
Average fare all passengers, cents	3.014	3.058	3.058
Car earnings per mile, cents	22.797	21.328	21.302
Operating expenses per car-mile, cents	17.752	15.191	14.868

Safety Films Exhibited in Schools

A room has been set aside by the Kansas City (Mo.) Railways for its safety department, under W. S. Woodland, superintendent. Equipment of portable screen, portable projecting machine, cabinets for literature and posters, and other materials have been supplied. Mr. Woodland recently received the directors of the company there, and outlined the safety work. He has started the motion-picture work in the schools, using the portable machine, with carbon filament light and slow-burning film, by which a picture in the film can be kept on the screen for ten or fifteen minutes. The school board has permitted safety programs for the schools, the picture being shown and lecture given in the school auditoriums or in the largest rooms during school hours. At each of these meetings the children receive buttons bearing the name of the school and the school colors. The company has also started its distribution of folders in its cars.

Consolidated Stock Not Limited by Fair Value

Illinois Commission Not Concerned with Past Evils—Without Valuation Allows New Stock Equal to Combined Outstanding Issues of Consolidated Companies—States Position in Recital on Each Certificate

IN permitting the consolidation of utilities, should a public service commission approve a new capitalization based on fair value of the properties involved, or should it permit new capital stock issues equal to the sum of the capital stock issues of the constituent corporations? A sensible answer to this important question in corporate financing is contained in a recent decision of the Illinois Public Utilities Commission *in re* the application of the Illinois Northern Utilities Company, the Freeport Railway & Light Company and the Tri-County Light & Power Company to be allowed to consolidate. In speaking for the majority, Commissioner O. P. Thompson holds that when the proposed capital stock issues of a consolidated company do not exceed the sum of the capital stocks of the combined companies, the commission is not required to determine the value of the property of the companies. In authorizing new issues of stock the commission always endeavors to prevent issuance except in exchange for money or property equal to the par value, but in its opinion the issuance of the stock of a consolidated corporation in lieu of a like amount of stock of the constituent companies is to be regarded as somewhat in the nature of a reissue of existing stock rather than as the issuance of wholly new stock.

A GOOD PLATFORM

"Where the proposed capital stock of a consolidated company does not exceed the sum of the capital stocks of the constituent corporations, the commission is not required to determine the value of the property of the companies. . . . [Such consolidated stock] is to be regarded as somewhat in the nature of a reissue of existing stock, rather than as a wholly new issue."

"The law as written intends that this commission should see that new security issues of existing utilities represent actual property, and it does not contemplate that the commission should concern itself with past security issues for the purpose of correcting the evils of former years."

"In the case of an entirely new concern, however, $1 of securities should stand for $1 of actual property."

In order to give wider publicity to these points, however, the commission in the present case has deemed it proper to direct the attention of the investing public to the fact that the authorization of the consolidated capital stock does not import that it has passed upon the value of the property. This is done by requiring that each certificate of stock of the consolidated company shall contain the following recital:

> "The Illinois Northern Utilities Company is a corporation formed by the consolidation of the Illinois Northern Utilities Company, the Tri-County Light & Power Company and the Freeport Railway & Light Company, as authorized by the Illinois Public Utilities Commission, by its order of May 31, 1916, and the amount of stock by said order authorized to be issued on such consolidation was fixed at $8,191,300 (being an amount equal to the aggregate outstanding stock of the constituent corporations), without investigation by said commission of the value of the assets of said corporations."

DISSENTERS HOLD DECISION TO BE CONTRARY TO LAW

The various questions involved in the decision are well brought out by the supplementary opinions filed by members of the commission, a joint dissenting opinion by Frank H. Funk and Richard Yates and a concurring opinion by Walter A. Shaw. Messrs. Funk and Yates aver that the issuance of any stock without a determination of the value behind the stock is contrary to the spirit and purpose of the public utilities law and contrary to public policy. They are not ready to accept the view that the law radically changes the procedure to be followed in the authorization of stock for consolidation purposes from the procedure laid down for the issuance of securities generally, or that the commission has no alternative but to issue an amount of stock equal to the sum of the stocks of the constituent companies. Furthermore, they object to the placing of the foregoing statement upon the new stock certificates because of the confusion and misrepresentation that they are sure will follow when in the future additional stock of the consolidated company is issued under the authorization of the commission without having any such statement printed on it.

COMMISSIONER SHAW SHOWS DIFFERENCE BETWEEN REORGANIZATION AND CONSOLIDATION

The concurring opinion by Commissioner Shaw, however, so explicitly expounds the Illinois law and the principles of equity behind the commission's decision that it is worth giving in detail. In the first place, Commissioner Shaw points out that the Illinois law treats of consolidations separately and distinctly from reorganizations. Relative to reorganizations of public utilities in this State, he says, the Legislature has spoken quite definitely and has decreed that the capitalization shall not exceed the fair value of the property. Relative to consolidations of public utilities, however, the Legislature has spoken definitely only in limiting the capital stock to an amount not exceeding the sum of the capital stocks of the corporations consolidated and any additional sum actually paid in cash for improvements. The Legislature undoubtedly had in mind that capital stock issues of anything less than or equal to such a limit would be proper.

The Legislature no doubt foresaw that the conditions involved in a consolidation of utilities are far different from the conditions prevalent under a reorganization. A reorganization, as Commissioner Shaw describes it, is generally the last chapter in a corporate history embracing a period of poor financing, faulty management, bad investments, unlucky operations, receivership and forced sale. Upon reorganization it is essential that some properly constituted administrative body should carefully scrutinize all the details by which it is purposed to place the defunct corporation on a proper financial basis, and it is quite natural that the best criterion for guidance in a reorganization is a valuation of the corporation's tangible property. In consolidations, however, the public itself is often the beneficiary, and the Legislature, in recognizing the many purposes for which consolidation may be legitimate, quite wisely refrained from making requirements to which it would be difficult to conform in effecting a consolidation. It is only fair to assume that, had the Legislature deemed it proper to require valuations to be made upon a consolidation of utility properties, it would have distinctly said so, and would not have left to the commission the determination of the rate cases wherein such a valuation might be necessary to protect the rights of the public.

INVESTOR IS FULLY ADVISED WITHOUT VALUATION

In regard to the assertion that a valuation should be required in the present consolidation case and that the total securities authorized should not exceed the value determined, Commissioner Shaw emphasizes the fact that no benefit would be derived from a valuation of the properties, even if the technical provisions of the law were different. The recital required to be placed on the new stock in effect advises all prospective purchasers that the stamped stock is issued as a result of a consolidation, that the total amount of consolidated stock is equal to the sum of the outstanding stocks of the underlying companies and that no valuation has been determined by the commission. To his mind, therefore, ample notice regarding the conditions under which the new stock has been issued is given to all prospective purchasers. In other words, the investor is advised fully that the new stock issue is no more valuable and has no more property behind it than the combined stocks of the underlying companies which it replaces, for conditions respecting the property are not changed by the decision of the commission. Had the commission refused to approve the new stock issue and thereby prevented the consolidation, the same amount of stock would be outstanding and subject to sale. Under the conditions of consolidation as stated, however, the investing public is really protected to a greater extent than formerly, for it is now advised by a recital in which the commission specifically calls attention to the fact that no valuation has been made of a property in which it (the investing public) is buying a shareholder's interest. Such a notice should tend to put a purchaser upon his guard, and to cause him to make the necessary investigation to satisfy himself as to the real value and future possibilities of the stock in which he contemplates investing his money.

RECITAL ON CERTIFICATES WILL NOT BE OBJECTIONABLE

As to printing special conditions upon the stock of the consolidated company and thereby making possible the future establishing of two styles of stock which in reality represent identical property interests, Commissioner Shaw confesses that a situation might arise wherein stock issued subsequent to the consolidation would not be stamped with the specific provision before noted. He doubts, however, that such a situation would be serious. The same situation is prevalent in almost all issues of securities which are approved by the commission for extensions and betterments. If a mixture of stock might be objectionable, it certainly could not be more objectionable than having outstanding, and in the hands of the public, stock issued prior to the creation and without the approval of the commission, and stock issued subsequently to the creation of the commission and bearing its general stamp of approval. It may be that many persons would believe that the commission's stamp of approval adds value to the one class of stock for the reason that the commission requires that property or money to the par value of the stock be behind the issue, but the commission's approval adds no value above whatever the combined intrinsic value of all the securities may be.

USELESSNESS OF VALUATIONS IN ALL SECURITY CASES

If it should be deemed necessary to cause a valuation of the property to be made whenever consolidations are contemplated and to disapprove consolidations unless such a valuation is made, Commissioner Shaw believes that the same policy should be pursued whenever the commission authorizes a security issue for any purpose whatsoever in connection with an existing utility. In such an event, it would naturally follow that, should it develop in a given case that the outstanding securities (par value) are in excess of the value of property, no funds could be raised for additions and betterments. If the commission should create such a condition, the result doubtlessly would be that the public would receive inadequate service and higher rates, and the utility in many instances would be forced into receivership.

And even if a valuation should be made in all security issuance cases, Commissioner Shaw seriously doubts that either the present owners of stock or the general public would be greatly benefited. Possibly future purchasers of stock would benefit by the knowledge of actual tangible values of property behind the stock issuance. But after all, he says, the value of stock either to the present stockholders or to the future investors is established and determined by the net earnings which the company is able to make, by the confidence in the company's officials, by the wisdom of its management and by its prospects. He cannot believe, therefore, that the Illinois public utilities law contemplates the impractical and endless task of making valuations of every utility property against which securities are to be issued. An accurate appraisal and a proper valuation necessitate expenditures of a magnitude requiring mature consideration before inflicting them upon the taxpayers of the State.

RELATION OF OLD AND NEW SECURITIES

Commissioner Shaw then takes up the question of securities issued under the laws of the State prior to the enactment of the public utilities law, and of securities now approved by the commission. To show how these are related he cites the following example:

"Assume a quite common case of a company which was capitalized some years ago at $100,000, which has installed plant and equipment to the value of $50,000 and which has issued capital stock to the full amount of $100,000. As the company grows, improvements and betterments costing another $100,000 may be installed. Meanwhile a regulatory body has been established, and this regulatory body authorizes the issuance of another $100,000 of capital stock against betterments which actually cost $100,000. Now there exists a condition wherein the total capital issue is $200,000 based on property costing $150,000 to install. The initial stock ratio, which was 50 cents on $1, in mingling with the new stock has reached a ratio of 75 cents on $1. Likewise the new stock, which bears the commission's stamp of approval, signifying to all intents and purposes that such new stock represents actual property to the par value of the stock, in mingling with the old stock also reaches a ratio of 75 cents on $1.

"Obviously, without a reorganization, the ratio of such combined stock will never reach unity, but under a continuance of regulation conditions surely will improve with time. Despite the most earnest and painstaking efforts of regulatory bodies, it is practically impossible to remedy in a jump such past corporation practices as have done much to necessitate the regulation of public utilities. During the transition period from a careless past to a better future, the investigating public will be misled if it assumes without inquiry that the authorization which the commission causes to be stamped on all securities issued at the present time by public utilities is a guaranty of the value of tangible property."

COMMISSION IS NOT INTENDED TO CORRECT PAST EVILS

Continuing along this line, the commissioner makes the following pointed statement concerning the jurisdiction of his regulatory body over securities issued under olden-day business ethics:

"I do not believe that it is the intent of the law that this commission should undertake to correct all the evils that grew under past unregulated conditions; or that this commission should act retroactively, so to speak, by requiring valuations of all existing utility property when allowing additional securities to cover additions and betterments in cases where previously existing outstanding securities may exceed the value of the tangible property. Should the commission adopt a policy of entering upon valuations whenever security issues are involved, it is predicted that a general financial upheaval as far as the public utilities of the State of Illinois are concerned would result therefrom. In the final analysis the public would be the loser.

"The law as written intends that this commission should see that new security issues of existing utilities represent actual property, and the law does not contemplate that this commission should concern itself with past issues for the purpose of correcting the evils of former years. This commission, by insisting that new securities be represented by property, in a reasonable length of time will secure an adjustment in the relation between outstanding securities and the value of property. In the case of an entirely new concern, however, I am firmly of the opinion that $1 of securities should stand for $1 of actual property."

NOT EVEN SECURITIES OF NEW COMPANIES ARE GUARANTEED

Desiring, however, to reiterate the position of the commission in regard to guaranteeing even the securities of new companies, Commissioner Shaw adds:

"Even in a case where a public utility is created and organized at this time under authority of this commission, and where all securities issued by the utility are approved by this commission with the understanding that every $1 of such securities represents an equal amount of either property or money, this commission can not state to the investing public that the investment is a good one. The commission in no manner can be held responsible for the management and future development of the property, nor may it essay to state whether or not the venture will prove a success. The commission can not, and should not, pass upon the many elements which may have a great bearing upon the earnings that reflect the value of stocks. The stockholders carry the risk. The bonds are an indebtedness which takes preference as to both principal and interest. That portion of the property and of the earnings which remains after meeting preferential obligations to the bondholders, accrues to the credit of the stockholders. In other words, after interest upon all bonded and floating indebtedness and all proper fixed charges have been met, the remainder goes to the stockholders. This residue, quite naturally, is affected by the character of the year's business, by the management, by local surroundings, by the general trend of finance and markets, and by many other possible uncertainties—all factors not ascertainable by a commission.

"In my opinion, the public should be advised as fully as possible that an approval by this commission of securities of any character whatsoever is not a guaranty on the part of the State as to the value of tangible property, as to an annual rate-of-return or as to the success of a utility's management. Moreover, it is to be impressed upon the public that past securities are neither validated nor approved, and that necessarily all future securities must be affected by existing outstanding securities. The public should be advised that it must exercise the same business judgment in dealing in public utility securities that it exercises in dealing in securities covering any other character of business. When this commission advises the public as fully as possible and when it has complied with the substance of the law, it has performed its full duty. I believe it would be a very unfortunate condition of affairs should the public ever believe that an approval of securities by any governmental agency carries with it or implies a broad guaranty of future earnings."

New Haven Electrification Situation Discussed

Specifications for Sixty More Electric Locomotives Are Being Prepared

AT an investigation of the passenger train-service of the New York, New Haven & Hartford Railroad held by the Massachusetts Public Service Commission at Boston, Oct. 17, Howard Elliott, president of the company, stated that motive-power specifications now being drawn include sixty additional electric locomotives for passenger, freight and switching service in the zone between New York and New Haven. The installation of these units will release steam equipment for other parts of the system, indirectly improving service at present handicapped by lack of tractive power. Mr. Elliott said that until the company gets upon its feet again financially, nothing can be done in the direction of electrification at Boston, but that this problem would naturally be taken up in the event of the road's reaching a financial basis exhibiting funds applicable to such a development. The company is endeavoring at present to utilize its existing electrical equipment and electrified zone to the utmost advantage and is not considering extending the electric service beyond New Haven. Speaking of the need of additional income, Mr. Elliott said that this applies to the electric railways controlled by the company as well as to the steam lines, especially in view of the rising costs of materials and labor.

A. R. Whaley, vice-president, said that the New Haven is at present provided with overhead equipment for electric train service from New York City to New Haven, but that seventy additional electric locomotives will be required to handle the entire passenger and freight traffic electrically throughout the zone. All the passenger service between New York and Stamford is handled electrically, and as many trains between Stamford and New Haven with such portion of the freight from the Harlem River to New Haven as the number of electric locomotives available permits. A total of 170 electric locomotives is needed to handle all the passenger and freight service of the New York-New Haven zone electrically.

The electric locomotives cost at least $50,000 a piece at present. The cost of steam locomotives has risen in some instances from $28,000 to $42,000 in the past three years, according to Mr. Elliott. The company cannot as yet say when it will have 100 per cent electrical operation in the New York-New Haven zone.

Solving the Labor Problem in Philadelphia

There Are Few Instances of Such a Remarkable Change in the Sentiments of Employees Toward Employer as That Furnished by the Philadelphia Rapid Transit Company—In Five Years the Company Has Built Up a Spirit of Concord and Loyalty to the Point Where a Strike Was Impossible of Success

By **THOMAS CONWAY, Jr., Ph. D.**

Professor of Finance, Wharton School of Finance and Commerce, University of Pennsylvania, Philadelphia, Pa.

THE details of the abortive Philadelphia strike of three months ago were given in the columns of the ELECTRIC RAILWAY JOURNAL of Aug. 12, page 288. The officials of the Amalgamated Association of Street & Electric Railway Employees of America issued a strike order effective Aug. 7. In response to this order, only 425 out of the 6200 motormen and conductors employed by the company responded. As soon as information was received that a strike was impending, the officials of the company sent out a circular letter to those men who had left its employ in good standing, stating that applications would be received from these men for re-entry into the service. This step was an exception to the rule of the company that a man who leaves its employ, no matter for what reason, will not be taken back. Impressed by the large number of men who desired to return, but who had not been able to do so because of this rule, the company felt that a considerable number of experienced motormen and conductors, familiar with operating conditions in Philadelphia, could be secured by this method. More than 2000 men applied, from which number 600 were selected to take the places of the strikers. The strike was a complete failure. Not a single trip was lost. The places of the strikers have been permanently filled by former employees.

Philadelphia has been the scene of a number of serious street railway strikes. During 1909 and 1910, the two years preceding the advent of the present management, there was a total of sixty-five days of declared strike, resulting in a loss of over $500,000 in wages to the men, the loss of the larger portion of the normal earnings for these days to the company, and extraordinary expenses exceeding $400,000. In addition, the city of Philadelphia was put to a heavy expense for extra police service. These strikes were symptomatic of a condition of great unrest among the employees. A record of the comparative number of conductors and motormen leaving the service for a number of years prior to the change in management follows:

	Year Ending May 31				
	1906	1907	1908	1909	1910
Resigned	3,226	3,922	2,853	1,494	3,787
Discharged	1,278	1,374	2,038	1,075	2,376
Deceased	*23	45	25	27	45
	4,527	5,341	4,916	2,596	6,208

*Includes deaths occurring between Jan. 1 and May 31, 1906, only. No record kept prior to Jan. 1, 1906.

In the year 1909-1910 the labor turn-over exceeded 85 per cent of the trainmen. Under such conditions, the creation of proper relations between the men and the company was impossible. It should be added, in passing, that these statistics do not take into consideration any of the men leaving in either strike. The large number of men who resigned was indicative of the general attitude which labor had to employment with the company. It was regarded as a makeshift—something to which men turned in the absence of a better opening and which they gave up as soon as employment in other lines could be secured. Few men looked upon it as a permanent calling. This was doubtless due in part to the large number of discharges, which created a spirit of uneasiness among the men.

ADVENT OF THE STOTESBURY MANAGEMENT

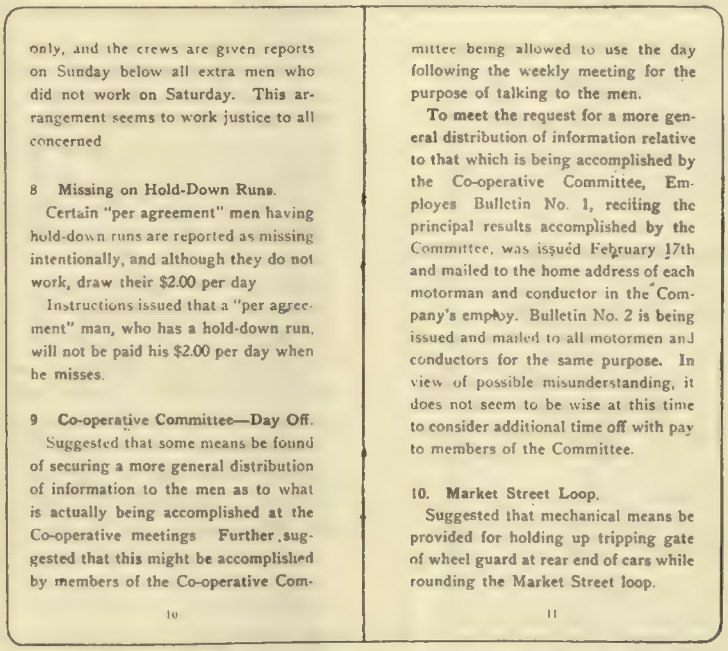
As the result of a number of conditions, of which strikes and labor difficulties were an important element, the financial affairs of the Philadelphia Rapid Transit Company reached a serious pass in the fall of 1910. Interests representing a majority of the stock of the company decided that the situation demanded heroic action, and an invitation was extended to E. T. Stotesbury, of the firm of Drexel & Company, to take over the management of the property. After short negotiations, in which Mr. Stotesbury outlined the terms under which he would assume responsibility for the affairs of the company, a plan was evolved by which the desired end was achieved. A majority of the stock was placed in a voting trust for a period of five years, Mr. Stotesbury naming the voting trustees. At the same time a sufficient number of vacancies in the board of directors was made available to insure Mr. Stotesbury's being in a position to control thereafter the policy and the business of the company. Thomas E. Mitten, then president and operating head of the Chicago City Railway Company, was prevailed upon to come to Philadelphia as chairman of the executive committee. A well-defined program of improvement was inaugurated. This article is concerned with only one feature of the new policy, namely, the company's policy toward its employees.

THE CO-OPERATIVE PLAN

After a short investigation and the analysis of suggestions and complaints made by the men, the new management presented to its employees what has since come to be known as the "co-operative plan." The essential features of this plan are, first, the creation of a co-operative committee, composed of representatives of the men and of the company, which shall consider and pass upon all matters relating to working conditions, other than general questions of policy, and, second, the creation of a wage fund, out of which payments for wages shall be made. This plan was subsequently adopted and is still in force. It is responsible in large part for the present healthy condition of the labor situation.

The co-operative committee consists of the superintendent of transportation, who acts as chairman, the division superintendents—at present there are fourteen divisions or car barns—and two representatives of the employees from each barn, elected by the men. The total membership in the committee, therefore, is forty-three. The election of barn representatives by motormen and conductors is conducted in the following manner: By the use of a voting machine each man writes in secret the name of a fellow employee for whom he desires to vote. The two men receiving the largest number of votes are elected. The reason for having two representatives from each barn is to give representation not only to a majority, but also to the larger part of the minority. The company, in its annual report for the year ending June 30, 1916, states that "over 97 per cent of the men able to vote have participated in the election of the present co-operative committee, the members of which represent the present choice of upwards of 73 per cent of all of the motormen and conductors."

In addition to the regular meetings of the co-operative committee the individual members of the committee are free to call upon the superintendent of transportation whenever they have matters they desire to discuss with him. At the beginning meetings were held as frequently as once a week, lasting from noon until late at night. At these meetings every committeeman is called upon to present the matters which have occurred to him or been brought to his attention by the men whom he represents. The matters thus brought up for discussion cover a wide range and relate to almost every portion of the service. In this fashion, the sources of dissatisfaction are called to the attention of the management and brought up for discussion and investigation. From the standpoint of the men, it furnishes an authoritative and direct means by which things can be brought to the attention of the company. There had always been, of course, the theoretical right of each motorman and conductor to go to the superintendent of transportation and present to him any matter connected with his employment. This right was more theoretical than practical, for the men felt that any such course of action would lead to the enmity of the division superintendents and would brand them as "kickers."



only, and the crews are given reports on Sunday below all extra men who did not work on Saturday. This arrangement seems to work justice to all concerned

8 Missing on Hold-Down Runs.

Certain "per agreement" men having hold-down runs are reported as missing intentionally, and although they do not work, draw their $2.00 per day

Instructions issued that a "per agreement" man, who has a hold-down run, will not be paid his $2.00 per day when he misses.

9 Co-operative Committee—Day Off.

Suggested that some means be found of securing a more general distribution of information to the men as to what is actually being accomplished at the Co-operative meetings Further suggested that this might be accomplished by members of the Co-operative Committee being allowed to use the day following the weekly meeting for the purpose of talking to the men.

To meet the request for a more general distribution of information relative to that which is being accomplished by the Co-operative Committee, Employes Bulletin No. 1, reciting the principal results accomplished by the Committee, was issued February 17th and mailed to the home address of each motorman and conductor in the Company's employ. Bulletin No. 2 is being issued and mailed to all motormen and conductors for the same purpose. In view of possible misunderstanding, it does not seem to be wise at this time to consider additional time off with pay to members of the Committee.

10. Market Street Loop.

Suggested that mechanical means be provided for holding up tripping gate of wheel guard at rear end of cars while rounding the Market Street loop.

10

11

TYPICAL PAGES FROM A "CO-OPERATIVE BULLETIN" OF WHICH ONE WAS ISSUED ABOUT ONCE A MONTH UNTIL THE SUMMER OF 1914

There is also a co-operative beneficial association, which pays sick benefits of $1 per day for 100 days following the first week's illness and a death benefit of $150. The entrance fee is 50 cents, with monthly dues of 25 cents. The company contributes an amount equal to the entrance fees and dues paid in each month by the members and bears the expense of the management of the association.

In addition, the company maintains for the benefit of all employees who have been two years or over in the service, without any cost to them, an insurance benefit plan which includes a death benefit of $500, and for employees over sixty-five years of age who have been twenty-five years in the service a pension of $20 a month for the remainder of their lives. The administration of the benefit and pension plans has been in charge of M. R. Kline, president of the Co-operative Beneficial Association.

ADVANTAGES OF THE PLAN

The great advantage of the co-operative plan is that the men choose representatives who are known to them and with whom they come into daily contact. All matters of dissatisfaction are brought to the attention of these representatives, whose duty it is, if the grievance seems to be genuine, to bring it up before the co-operative committee. To the executive officials of the company many matters seem trivial which bulk large to the men who must deal with them each day. Perhaps the rest-room is not kept clean, or the roof over the passageway in a carhouse may leak, causing the men on rainy days to take an involuntary shower bath on the way to take out their cars. Time-table adjustments may be necessary to accommodate increased traffic. These are but typical instances of the questions which have come before the co-operative committee. Thus far, the committee has been a real committee and not a "kid glove" body. The committeemen do not hesitate to present forcefully matters looking to improved working conditions. The reason for having each division superintendent a member of the committee is that both sides of the matter may be heard at the same time. The committeeman presents the men's side, whereupon the chairman calls upon the division superintendent to state his view of the matter. In this way the other committeemen present hear both sides of the question. Time is saved, because frequently matters can be adjusted or decided without reference for investigation. It should be stated in passing that there is no record of a division in the vote between the men and the superintendents on a decision of the committee. Matters are threshed out until a substantial agreement is reached. Many of the matters occupying the attention of the co-operative committee might appear trivial to the outsider, but they are of real concern to the men who meet them every day. They breed constant irritation, dissatisfaction and discontent—the seed from which spring strikes and discord. The co-operative plan performs the great service of eliminating these sources of discontent before they become real grievances.

It is impossible for the operating officials of a company and the chosen representatives of its employees to sit in conference over questions such as come before the co-operative committee without creating a better mutual understanding of the position which each occupies. The officials learn, as they could not otherwise do, the viewpoint and thoughts of the men. They see the operations of the company through the men's eyes. On the other hand, the meetings of the committee teach the men the limitations governing the operation of the system. Proposals are continually made which are impracticable for financial and other reasons. Pains have always been taken to explain to the committeeman making the suggestion why it is impracticable. In this fashion, men get a good grasp of the principles of operation which inevitably filters down to the men whom they represent. It is significant that not a single member of the co-operative committee went out at the time of the recent strike, although there is and always has been a number of committeemen who are frank in their criticism of the company. Experience has demonstrated that such critics in the course of time are unconsciously educated to see the situation from a different standpoint.

Attitude Toward Organized Labor

One of the questions which complicated the institution of the co-operative plan was the relationship which it was to bear to organized labor. At the time the plan was announced, two labor organizations were largely represented among the car men—the Amalgamated Association of Street & Electric Railway Employees of America, and the United Car Men's Association of America. These two organizations were antagonistic to each other. The announcement of the co-operative plan stated that:

Some Things Accomplished by Present Co-operative Committee

1. Less discharges than any other barn.
2. Smaller number of men being suspended.
3. Pay of runs compares with any in system.
4. Conductors and motormen are allowed their Sunday off, both early and late, as conditions permit.

Swing men work every third Sunday instead of every other Sunday as formerly.

Show Your Approval by Electing Them August 17, 1916

LEAFLET ISSUED BY MEMBERS OF CO-OPERATIVE COMMITTEE AT LAST ELECTION (AUG. 17, 1916)

"This management does not take a position for or against either of the organizations having membership among its motormen and conductors, but is desirous of securing a lasting peace and the earnest co-operation of its motormen and conductors, and that by the path of least resistance. If, therefore, a large majority of the motormen and conductors (say two-thirds) desire that this management deal with its motormen and conductors as an organized body, no lasting peace or unity of effort can be expected until this demand has been properly met and fairly disposed of. This management cannot, upon the other hand, so interfere with the personal liberty of any man in its employ as to arbitrarily require him to become a member of a labor organization. It can, however, in all fairness, pay from the sum representing 22 per cent of the gross passenger earnings that amount which represents the dues of all motormen and conductors in a labor organization if that be the expressed desire of the large majority.

"The desire of two-thirds of the motormen and conductors expressed by secret ballot, under conditions which insure a fair count, may in all justice be considered as binding the minority to bear their share of such a tax.

"This management has, therefore, decided that upon a proper application being made by either or both of these organizations, a vote will be taken under such regulations as will insure a fair election; this management undertaking, upon a confirmative vote of two-thirds of its motormen and conductors, to enter into an agreement with the organization receiving such vote, which agreement shall conform both in substance and detail with the plan herein outlined.

"In the event of an agreement being entered into with the men as an organization, there would be no necessity for the wearing of union badges nor of the disturbing influence of organizers or collectors of dues, for the reason that the amount representing the dues of every motorman and conductor would then be paid directly by the company to the organization.

"Under these circumstances, the frequent contention that men were dismissed because of being affiliated with organized labor would be no longer tenable, as the company would under this arrangement be paying the dues of the new men when hired as well as those now in the service."

At various times three ballots have been taken to determine whether the company should deal with one or the other of the labor organizations. In no case have two-thirds of those voting indicated a preference for either of the labor organizations. The company has therefore dealt directly with the men without the intermediation of either organization. At the present time it is believed that only a small proportion of the men are affiliated with either union, although no definite information is available. The company has always taken the position that it makes absolutely no difference to it whether a man does or does not belong to a labor union.

It is essential, in order to maintain discipline, that the management of the company reserve the right of discharge and the final determination of all questions affecting discipline, but through his co-operative committeeman any man who feels that an injustice has been done in his case is entitled to a review of the facts. In case the employee so desires, one or both of the barn committeemen is privileged to accompany him on a visit to the superintendent of transportation when the man presents his side of the case. The superintendent of transportation makes it a practice to investigate carefully every case appealed to him, and he has not hesitated to reinstate men or modify the punishment for offenses when it seems warranted. The early "bulletins" issued to the men detailing the workings of the co-operative plan record many instances of this character. Instead of undermining discipline, this course of action has had a very salutory effect. Arbitrary discharges were discouraged, while the confidence of the men was won by the plain intention of the new management to "play fair."

Effective Work of Mr. Tulley

The effectiveness of any plan is dependent upon the type of man who executes it. The co-operative plan has been unusually successful largely because of the high character of the superintendent of transportation,

H. G. Tulley. Mr. Tulley was brought from Chicago by Mr. Mitten after the new management assumed control and has been an efficient lieutenant in carrying out Mr. Mitten's policy. The new superintendent of transportation has enjoyed unusual experience in handling men. He served some years as an army officer, and thus acquired the ability to maintain strict discipline and at the same time get along with all sorts of men under trying conditions. His experience was still further enlarged in Chicago. When the Philadelphia property was taken over, with its menacing labor situation, Mr. Mitten decided that some unusual remedy must be applied. To meet this need he evolved and inaugurated the co-operative plan and intrusted to Mr. Tulley much of the responsibility for the successful carrying out of the details, particularly those relating to discipline and working conditions.

There is no doubt that Mr. Tulley is exceedingly popular with his men. He has earned this popularity as the result of five years' association with them. They are loyal to him because he has been fair to them. He has worked on the principle that he must preserve each employee's self-respect if he is to have a desirable working force. When a man has been reported as delinquent and comes in to see him, he remembers that this man is probably the head of a family, with a wife and dependent children; an average American citizen. Instead of browbeating the man and villifying him, he is courteous and finds that the men appreciate being dealt with upon this basis. In his five years' experience he has discharged but few men who, at the end of the interview, would not shake hands with him. In the last two years he has personally talked with every man entering the company's employ, endeavoring to instil in the new recruit at the outset the spirit governing employment with the company. He wants his men at the beginning to look upon their work as permanent employment. The company has employed about 800 men in the last two years, of whom only thirty went out on the recent strike. As Mr. Tulley phrases it, the time spent in talking to his new men has been very profitable to the company, for he has "kept the stream pure at its source."

TRANSITION TO A PERMANENT LABOR FORCE

The effectiveness of the policy of the new administration in building up a permanent working force is clearly seen by comparing the record of the men leaving the service prior to 1910, as given above, with the record since the new management assumed control:

	Year Ending May 31					
	1911	1912	1913	1914	1915	1916
Resigned	1,390	913	956	337	175	275
Discharged	1,635	855	536	334	142	117
Deceased	41	49	55	53	42	59
	3,066	1,817	1,547	724	359	451

The progressive decrease in the number of men who have been discharged is very significant. It will be remembered that in the last year preceding the advent of the new management, the total number of changes was 85 per cent of the entire platform force, while the number of discharges was 2376, or almost 50 per cent of the total number of men employed as conductors and motormen. The marked reductions which have occurred in each year since that time is the best index of the working of the co-operative plan. In the year just closing, only 117 men were discharged. In the year 1909-10, almost 3800 men voluntarily left the employ of the company. In 1914-15, the number so leaving was only 175. The increase in resignations to 275 in the last year represents the attraction of the high wages paid by the munitions factories and other industrial establishments which play an important part in Philadelphia's industrial life.

THE TWENTY-TWO-PER-CENT FUND

The second important feature of the co-operative plan provided for the establishment of a wage fund from which wages should be paid and by which increases in wages should be governed. Investigation showed that the proportion which the wages paid to motormen and conductors in the year ending June 30, 1911, bore to the gross passenger earnings of that year was 21.81 per cent. The company took the position in its co-operative plan that the men should share in the hoped for prosperity of future years, and announced that it would "commencing as of July 1, 1911, pay to its trainmen that amount which, in total, will represent twenty-two cents out of every dollar collected out of the payment of fares. . . . The introduction of larger cars and better operating methods, together with proper co-operation between the men and the management should very materially improve the operating efficiency of the company, thereby making possible an increased scale of wages." The wages paid the men in April, 1911 were as follows:

New men, 22 cents per hour.
After one year's service, 23 cents per hour.

At the present time, the new men are receiving 27 cents per hour, the scale advancing 1 cent for each year of service, so that employees who have been with the company over five years are receiving 32 cents per hour. The motormen and conductors' wages have therefore been increased about 39 per cent in the last five years.

REASONS FOR WAGE INCREASE

Inasmuch as this increase was paid out of 22 per cent of the gross earnings of the company, it is obvious that the higher wages were the result of more economical operation, or to be exact, larger revenues per car-hour. The more important factors which have enabled the company to make this increase in car-hour earnings and in wages have been:

1. Adjustment of time-tables to eliminate wasted car-hours.
2. Introduction of cars of larger seating capacity.
3. An increase in the average rate of speed.
4. Rerouting of lines so as to increase the rush-hour capacity of the tracks in the downtown district and secure the most direct movement of traffic.
5. Improvement of discipline and of operating methods, which has resulted in a marked decrease in accidents.

The last named factor is contributorily rather than directly responsible for the increase in earnings and, hence, in the wage fund. It is significant as pointing to the fact that the establishment of cordial relations between the company and the men was not achieved at the expense of discipline and efficient operation.

In many ways the company was fortunate in so far as increasing wages was concerned in being able to institute so many important improvements. The compromise forced upon the company in the 1910 strike provided for straight runs. This uneconomical method of operation resulted in a large excess of car mileage during the middle of the day and in the early morning and evening, and a deficiency of service during the traffic peaks. The new management put it up to the men that if wages were to be increased, economical operating methods must be adopted. The wastefulness of unnecessary service was demonstrated, and the men were asked to co-operate in readjusting runs in order that facilities might be made to fit traffic needs. It was provided that wherever swing runs were to be inaugurated, the men should be able to complete nine hours of work in fourteen hours of time. The necessary number of swing runs were introduced without serious objections from the men. It might be said, in passing, that when a new time-table is put out, it is submitted to the committeemen of the divisions affected. They are told that the company is indifferent as to whether the men shall have a nine or a ten-hour day, and, so far as possible, the new schedules will be planned to fit their convenience. The committeemen will ascertain the sentiment of the majority of the men and report the results. After schedules have been prepared upon the basis of this investigation, the men are allowed to select their runs according to seniority, the oldest men in point of service having the first choice, and so on.

The elimination of unnecessary straight runs reduced to a considerable extent the number of car-hours and hence indirectly increased the percentage of the wage fund available for each employee, because increases in the number of men were not proportionate to the increase in the volume of business handled.

The reconstruction of the time-tables has been in charge of Leon Jewell, superintendent of time-tables, who had previously had many years' experience in making schedules in Chicago. Mr. Jewell, in arranging the time-tables in Philadelphia to provide the increased car capacity during the morning and evening rush hours, has found it possible so to divide the required hours of service into runs as to meet to a remarkable degree the preferences of the men, expressed through the co-operative committeemen.

One of the most important factors in bringing about higher wages was the purchase and introduction of 1500 "near side" cars, which replaced small cars of antiquated type previously operated. Through better schedules and larger cars, the earnings per car-hour have been steadily increased.

Gradually and almost imperceptibly, the scheduled running time was quickened with the introduction of new cars. At present it is safe to say that the scheduled speed is 2 m.p.h. faster than it was when the new management assumed control. That this is not accomplished by recklessness is proved by the fact that accidents have been materially reduced.

Routing of lines was very unscientific when the new management assumed control. The existing system of routes had been criticized by the expert engineers employed by the Pennsylvania State Railroad Commission in its investigation of the company made in 1910. The old routes were relics of the horse-car days, most of them having been instituted during the competitive régime of the fifties, sixties and seventies. Using as a starting point the recommendations of the expert engineers to the State Railroad Commission and after careful study of the changes in traffic occurring since that investigation was made, the company, by a series of successive steps, rerouted the car lines in every part of the city. Routes were shortened, decreasing the time required to travel from any part of the city to the central business district, and improvements in general traffic conditions effected as the result of these changes. In this manner the earnings which a car could make in a day, and consequently the earnings per car-hour were materially increased.

Co-Operation for Operating Efficiency

It is significant to note that the importance of the improvement in operating conditions was never lost sight of by the employees of the company. They were anxious to increase as rapidly as possible the 22 per cent wage fund. Any change which would increase that fund was a matter of great interest to them. This 22 per cent fund probably did more to bring home to the men the essential elements of partnership between the employees and management of a street railway than any other feature of the co-operative plan.

The company looks forward to even more harmonious relations with its employees in the future. The strike has automatically cut off most of the dissatisfied employees. Their places have been taken by men who have had experience with the company and who desired to return to its service. At the present time the company believes that it has a body of satisfied employees, who desire to continue the co-operative plan and believe in its efficiency.

Steam Railroad Revenues in 1916

The revenues of steam railroads in 1916 amounted to $3,508,529,950, according to statistics compiled by the Bureau of Railway News and Statistics. These figures were compiled from the monthly returns to the Interstate Commerce Commission for an average of 258,988 miles of line operated during the year ended June 30, 1916. For this year the operating expenses and taxes totaled $2,452,022,700, thus giving a net operating income of $1,056,507,250. The ratio of expenses to revenues was 65.54 per cent, and the ratio of operating expenses and taxes to revenue was 69.88 per cent.

The bureau states that in the eight years from 1907 to 1915 the revenues of the steam railroads increased only 15 per cent or less than 2 per cent a year, whereas for the single year 1915-1916 they showed an abnormal growth of nearly 18 per cent. This result was mostly due to an increase of $438,000,000 in freight receipts. Such receipts constituted 70.93 per cent of the total operating revenues, the highest in the record of American railways. As a corollary to the phenomenal increase in freight revenues, the proportion of receipts from passengers was reduced far below the average. This, however, was partly due to an actual recession in passenger revenues from the figures of 1913 and 1914.

The amount paid by the steam railroads in taxes in 1916 was 103.08 per cent more than that paid ten years ago. The net operating income amounted to barely 6.05 per cent on a net capitalization of $67,400 per mile. This is the highest percentage since 1906, the amount then being 5.74 per cent. Four times in the last ten years the return was below 5 per cent.

An Appeal for Brickbats

Don Marquis, in his column in the New York *Evening Sun*, a few evenings ago had this comment on the appeal for financial support of the men still on strike in New York:

"The striking carmen have organ grinders stationed about the streets of New York City with signs begging financial help for the strikers from the general public.

"At the same time they or their sympathizers are stoning the cars in which the general public must ride.

"It is all beautifully simple. You give the strikers a nickel and they buy a brick with it and soak you with the brick.

"Any man who isn't willing to pay a little something toward having his skull fractured must be a d—d capitalist, a grinderofthefacesofthepoor, a tightwad, an enemy of the republic and a low-life.

"If you are a gentleman and a true sympathizer with the Down Trodden you will give them a quarter so they can buy enough bricks not only to maim yourself, but to shatter your wife's cranium and cripple your little girl as well."

Specifications and Standard Definitions

Correct and Uniform Descriptions and Specifications of All Materials and Supplies Are of Great Importance to Purchasing Departments

BY H. B. TWYFORD
Formerly Purchasing Agent Underground Electric Railways of London, Ltd.

ONE of the fundamental principles of good purchasing is the proper selection of the sources from which supplies are obtained. The importance of this phase of the work of the purchasing department was dwelt upon in the ELECTRIC RAILWAY JOURNAL of June 10, 1916.

Another matter which is of equal importance, although it does not offer so much scope for imagination and creative work on the part of the purchasing agent, is the correct and uniform specifying of all materials and supplies. In fact, with these two features thoroughly and efficiently covered the purely mechanical and physical work of the department should proceed smoothly and quickly. Moreover, more than half the battle of getting the right price is won if these two essentials are properly secured. The knowledge that the companies asked to quote are positively the best to give the right articles and service insures the competition being sound, and this, combined with the fact that the material or article is properly specified and described, gives absolute assurance that all bidders are quoting on exactly the same grade, quality, finish, size, etc.

The average buyer is commercially rather than technically trained and it is not to be assumed that a man buying a wide variety of materials can be so well informed technically as to be able to accurately specify each one of his purchases. Nevertheless, he should have some superficial knowledge of technical and mechanical subjects and this in itself must be considered a definite accomplishment. In general, the man who buys a specific grade of material in large quantities at regular intervals will not suffer from a lack of knowledge concerning the technical characteristics of that material. He will from observation, if not sheer necessity, acquire all points of information required for the satisfactory and economic purchase of the commodity.

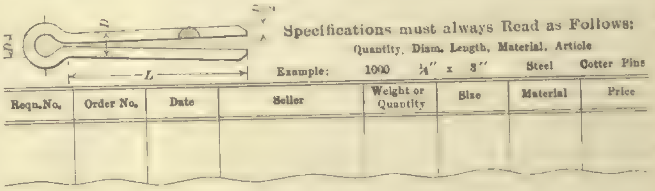
SPECIFICATIONS

The purchasing departments of railroads, public service corporations and many manufacturing plants depend on the engineering staff to furnish them with correct specifications for their heavy purchases, and also those which require description in detailed technical terms. To a large extent this means that the purchasing agent's work is a matter of specializing on price and delivery because the question of what to buy has been predetermined by exhaustive practical experiments, the results of which are contained in the standard specifications furnished to him and which he uses in canvassing the market and placing his orders. It must not be inferred from this that his work is merely clerical, for it is necessary for him to know something of the material he is buying and the antecedent manufacturing processes through which it has passed.

It is not the purpose of this article to discuss these specifications. They should be printed or typewritten in suitable quantities properly numbered and indexed and kept in the files of the purchasing department in readiness to send out with inquiries and orders.

STANDARD DEFINITIONS FOR SMALL ARTICLES AND MATERIAL

There are, however, a large number of small articles purchased which are frequently improperly described or for which there are no standard definitions. The foreman on some track work or the man in charge of an emergency or breakdown job needs something for which he applies to the storekeeper. The storekeeper may make a requisition on the purchasing agent, who places an order. It frequently happens that these three men will use varying methods or descriptions of the same article. This leads to confusion and reference back to each other, causing delay and expense. Moreover, how many persons in the purchasing department could give offhand the correct method of specifying the dimensions of a simple article such as a cotter-pin and tell whether the length should be given over all or under the head?



Specifications must always Read as Follows:
Quantity, Diam. Length, Material. Article
Example: 1000 ¼" x 3" Steel Cotter Pins

Requ.No.	Order No.	Date	Seller	Weight or Quantity	Size	Material	Price

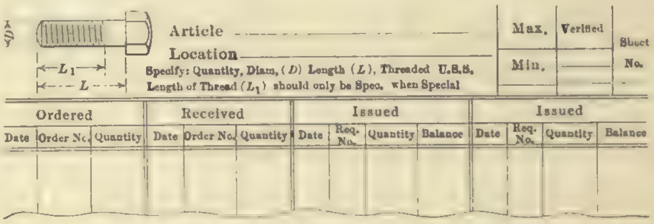
STANDARDIZING PURCHASES—FORM I—SHOWING PURCHASE-ORDER RECORD WITH SKETCH OF ARTICLE AND SPECIFICATIONS

Similar questions might be asked in regard to rivets, nuts, carbon brushes, mica washers and many other small articles.

The rectification of these conditions can be undertaken by the purchasing department and uniform descriptions of all small articles standardized and put into force throughout the organization. An excellent plan is to have sketches made which can be suitably reduced in size and printed with the specifications on the purchase-order record. An illustration (Form I) of these is presented herewith, from which it will be seen that when an article may be thus visualized, it becomes second nature always to use the same procedure in giving the dimensions or description.

Such a purchase-order record as that illustrated is valuable for reference purposes. From it can be obtained:

1. A complete index of all orders under the name of the material.
2. A list of all vendors from whom the material has been purchased.
3. A record of prices paid, the fluctuations being easily followed by glancing down the last column.



Article
Location
Specify: Quantity, Diam, (D) Length (L), Threaded U.S.S.
Length of Thread (L_1) should only be Spec. when Special

Max.	Verified	Sheet No.
Min.		

Ordered			Received			Issued				Issued			
Date	Order No.	Quantity	Date	Order No.	Quantity	Date	Req. No.	Quantity	Balance	Date	Req. No.	Quantity	Balance

STANDARDIZING PURCHASES—FORM II—SHOWING STOREKEEPER'S STOCK RECORD WITH ILLUSTRATION OF ARTICLE

4. A compilation of the total quantity of material purchased over any period.
5. A standardization of specifications and definitions. Whenever possible a sketch should appear on the record, but with such things as sheet mica, sheet fiber, cotton waste, etc., the standard method of specifying should be printed across the top of the page, *e.g.*, "100 lb. clear North Carolina mica cut 1½ in. x 4 in.—standard for testing purposes must be submitted before order is placed."

Illustrations should also be placed on the forms used by the storekeeper in keeping his store records, because his descriptions will then harmonize with those of the purchasing department. Form II is an illustration of a storekeeper's stock record (card or loose-leaf sheet) showing the method of specifying hexagon-head cap screws. This, of course, should be uniform with the method of specifying shown on the purchase-order record for the same article. It may be possible also to furnish the superintendent and foremen with copies of the standard definitions, thereby securing uniformity throughout the organization.

The writer has had to handle large batches of requisitions as they came into the purchasing department daily, and many of these would have been unintelligible or would have needed explanation or better description if placed before vendors and suppliers. This meant that the purchasing department had to beat them into shape before any action could be taken either in getting quotations or in placing orders. It frequently happened that the requisition was too obscure to be correctly deciphered and had to be referred back to the maker. This was bad enough in its influence on the internal economic administration of the establishment, but in those cases where the material was needed for an emergency job it might have been very serious.

The prime considerations in specifying small articles and material are accuracy and brevity, but at the same time nothing essential should be omitted. Sometimes two or three words will suffice and the inclusion of an unnecessary word may lead to misconception and uncertainty.

TECHNICAL AND MECHANICAL TRAINING FOR PURCHASING DEPARTMENT EMPLOYEES

It is a practice with many large manufacturing corporations to give their salesmen a course in the shop, where familiarity with the manufacturing processes can be acquired as part of their education and training. It would be of great value to public service corporations if they offered facilities for all employees in their purchasing departments to become acquainted by practical experience with the requirements of their construction, operating and repair work. It would put them in close touch with the needs of the organization, which is a prime requisite in good buying.

Every purchasing agent has substitutes offered to him, and the natural tendency in such cases is to refuse to entertain any suggestions regarding these which would involve paying a higher price. A person, however, with an intimate knowledge of the use to which the material was to be put might see where a saving could be effected even if the actual price paid per unit was higher. This knowledge, too, is often valuable in the cases of emergency requisitions for repair work, when the actual material specified cannot be obtained promptly, but a substitute can be purchased for immediate delivery which will answer equally well.

ECONOMIC BENEFITS OF BETTER SERVICE

Inaccurate, inadequate or loosely worded descriptions of material are far too common. In many purchasing departments the straightening out of trouble caused by them is looked upon as a necessary evil, and as part of the routine work of the department. It has already been pointed out that where these conditions prevail the department and the organization are working at a serious economic disadvantage. An inordinate amount of time may be consumed in getting requisitions into intelligent shape. This means delay in placing orders with the contingent possibility of delaying emergency and repair work.

If correct definitions are not applied to all materials and articles as the requisitions arrive in the purchasing department, and inquiries and orders carrying an ambiguous meaning are sent out to suppliers and vendors, the trouble is sown broadcast among these, causing further losses and delays. Many business houses could testify to this result, for they come in contact with it daily. By better methods in the purchasing department a very large percentage of the trouble and loss can be prevented if it is not entirely eliminated.

Initial Resistance to Car Motion

Some Measurements of the Forces Necessary to Start Different Types of Cars Are Described in This Article

BY D. D. EWING

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IN connection with the attempts which many roads are making to reduce energy consumption and starting peaks, data on the forces which oppose car motion at the instant of starting should be of interest. The energy losses which can be traced directly to high initial train resistance are, of course, small. Since a car of high initial resistance will, other things being equal, accelerate at a lower rate than one of low initial resistance, however, certain indirect energy losses of more importance than the direct losses may result from high initial train resistance. These losses, combined with the fact that, by affecting the accelerating rate, the initial train resistance also affects the schedule speed, make the problem of investigating the initial resistance to car motion worth while.

In the ELECTRIC RAILWAY JOURNAL for Aug. 14, 1915, page 279, the writer discussed the results of some tests made on the Purdue test car. In these tests the initial friction was determined for several conditions of track by two independent methods, namely, the current-input method and the dynamometer method. As the values obtained were higher than those ordinarily assumed it was decided to continue the investigation by making tests on other cars, and within the last year tests on several different types of cars have been made. In these later tests the dynamometer method only was used.

TABLE I—DESCRIPTION OF CARS

CAR		WEIGHT		Gage of Wheels, Ft.-In.	Diameter of Wheels In.	CONDITION OF	
Name	Number	Light	Total			Wheels	Bearings
Ft. W. & N. I. T.	659	14,200	14,200	4–8½	33	Worn, rusty	Dry
Ft. W. & N. I. T.	146	23,500	23,500	4–8½	34	Worn	Well lubricated
Ft. W. & N. I. T.	227	25,500	25,500	4–8½	31	Worn	Well lubricated
Ft. W. & N. I. T.	251	40,400	40,400	4–8½	33	Fair	Well lubricated
Purdue	Test car	54,000	54,000	4–8½	33	Good	Well lubricated
Ft. W. & N. I. T.	303	70,700	70,700	4–8¾	36	Fair	Well lubricated
C. T. H. & S. E. .	7,426	38,800	138,000	4–8	33	Good	Well lubricated
C. T. H. & S. E. .	7,737	38,700	134,000	4–9	33	Worn	Well lubircated
C. T. H. & S. E. .	7,173	38,700	137,500	4–8¾	33	Good	Well lubricated
C. T. H. & S. E. .	7,218	38,800	137,500	4–8¾	33	Good	Well lubricated
L. & N.	69,569	35,600	111,200	4–8	33	Good	Well lubricated
C. T. H. & S. E. .	7,589	38,800	38,800	4–8¾	33	Good	Well lubricated
Penn.	302,147	38,800	38,800	4–8½	33	Good	Well lubricated

Some of the main features of the cars tested are tabulated in Table I. The first three are single-truck motor cars, the second three, double-truck motor cars and the balance, steel coal cars selected at random from cars placed on the university power-house tracks. As indicated by the figures in the weight columns all of the motor cars and the last two coal cars were not loaded.

RESULTS OF TESTS

Table II is a summary of the test results. In the column headed, "Average Pull, Pounds," is given the average force, applied at the drawbar, necessary to produce a perceptible movement of the car. This average force was determined by averaging the dynamometer readings for the number of observations listed in the next column. The average pounds pull per ton listed in the last column was obtained by dividing the average dynamometer reading by the weight of the car in tons. That some of the individual readings deviated from the average value is indicated by the figures for the maximum and minimum "Pounds Pull per Ton." As in the preceding tests, however, the majority of the observations gave results which were quite close to the average.

Car No. 659 had been standing in the barns for several months prior to the test. In order to limber it up, it was run back and forth over the test track for some time. Even with this preliminary limbering up its average initial train resistance was 72 lb. per ton. The second test made on the same car after the bearings had been carefully repacked and lubricated gave 67 lb. per ton. With the exception of the Purdue car all of the other motor cars were taken out of regular service for test. For the Purdue car the average pull of 1070 lb. checks very closely the average of 1060 lb. obtained with a different dynamometer the preceding year. Tests were attempted on two other motor cars, one of 40 tons weight and the other of 44 tons. Although the attempts to pull these cars were made immediately after the cars came in from a 115-mile run the forces necessary to start them were beyond the range of the dynamometer which had a capacity of 2500 lb. Apparently their initial train resistance exceeded 60 lb. per ton.

TABLE II—RESISTANCE DATA

Test Number	Car Number	Car Weight, Tons	Air Temp. Deg. Fahr.	Average Pull, Pound	Number Observations	Pounds Pull per Ton Maximum	Pounds Pull per Ton Minimum	Pounds Pull per Ton Average
1	659	7.1	36	515	104	105	46	72
2	659	7.1	38	475	100	86	55	67
3	146	11.75	34	385	204	58	24	33
4	227	12.75	38	480	167	46	26	38
5	251	20.2	40	620	175	42	22	31
6	Test car	27.0	57	1,070	100	47	34	40
7	303	35.0	40	1,450	100	46	37	41
8	7,426	69.0	32	1,000	11	19	12	14
9	7,737	67 0	27	1,600	51	28	21	24
10	7,173	68.75	27	1,425	79	25	18	21
11	7,218	68.75	27	730	68	15	8	11
12	69,569	55.6	28	1,425	80	28	22	26
13	7,589	19 4	33	800	84	48	35	41
14	302,147	19.4	52	925	167	56	41	48

The freight cars were all moved a sufficient distance to turn the wheels over several times before the readings, which were averaged to give the results listed in the table, were taken. Pulls made after the cars had been standing a number of hours indicated that the pull necessary "to break a car loose" after it had been standing awhile was from one and one-half to two times that listed in the table. Other experiments showed that the force necessary to keep a car moving at approximately 1½ m.p.h. varied from 0.4 to 0.75 of the average given in the table. It was observed in all cases that the resistance to car motion decreased very rapidly with slight increases of speed.

The values given in the table are for straight level track. In taking the readings the pulling force was applied gradually so as to reduce the rate of acceleration and, therefore, the portion of the applied force necessary to accelerate the car mass to a minimum. While no really definite conclusions can be drawn from the above data regarding the relations between type or light weight of car and initial train resistance, the results taken as a whole seem to indicate that the values of initial train resistance usually assumed are too low.

The tests were carried out as thesis work by R. B. Nichols, R. F. Stuart and G. C. Waples. To them and to Jack Abbot, superintendent Fort Wayne & Northern Indiana Traction Company, who gave material assistance in making the tests, the writer desires to express his indebtedness.

Shop Lighting and Other Subjects Discussed by Railway Electrical Engineers

Importance of Monthly Cleanings for Lamps in Shop Lighting Costs—Data on Electrical Equipment for Steam Railroads—Electric Versus Pneumatic Tools

AT the ninth annual convention of the American Railway Electrical Engineers' Association, which was held at the Hotel LaSalle, Chicago, Oct. 31-Nov. 3, a number of committee reports of interest in the electric railway field were presented, among them being one covering the subject of maintenance of illuminating equipment. This report applied especially to the illumination of railway shops, and attention was called to the fact that in modern industrial plants it is considered good practice for the cost of light range from 0.5 per cent to 1 per cent of the total wages paid to employees in the shop. This does not appear high when it is considered that only four minutes of the average workman's time costs the same amount as the illumination of his work for an eight-hour day, and that insufficient light may cause him to lose time far in excess of this amount.

MAINTENANCE OF SHOP-LIGHTING EQUIPMENT

The report submitted approximate data covering the total annual operating costs of a 1000-watt gas-filled lamp with porcelain reflector and a 750-watt quartz lamp by which it was shown that the total effective lumens of the two were 13,400 and 12,500, approximately the same in either case, while the first costs were respectively $10 and $60. The annual fixed charges, including 75 cents for cleaning, were respectively $1.71 and $8.64, while the maintenance costs per year of 4000 hours were assumed to be the same at $20 per year. Energy delivered to each lamp at 2 cents per kilowatt-hour amounted respectively to $80 and $60, making a total operating cost for the gas-filled lamp of $101.74 and for the quartz lamp of $88.64. Among these items the largest one is the cost of energy, and in general, this item averages about 75 per cent of the total annual operating cost. Hence efficiency of the unit is really of first importance.

However, with regard to the various lighting units that are competitors for railway shop lighting, the report favored the tungsten lamp on account of its reliability, low first cost, simplicity and ease of maintenance. With this lamp the influence of cleaning was stated to be of considerable importance, and a curve was submitted to show that the loss at the end of twelve months without cleaning in an average railway shop equipped with 1000-watt gas-filled lamps and porcelain reflectors approximates $22 per lamp, the loss during the last month being at the rate of $34 a year. From this it was deduced that money spent for cleaning once each month brings a return of more than 60 per cent.

The following materials were recommended for use in cleaning lamps: (1) Soap and water; (2) Gasoline or benzine; (3) Denatured alcohol; (4) Ammonia. For ordinary conditions soap and hot water will thoroughly clean lamps and reflectors, although in most railway shop buildings where smoke and oily fumes are present it is necessary to use some ammonia. Denatured alcohol will cut dirt much more quickly and better than gasoline and less of it is required per lamp. Hence, although alcohol costs approximately twice as much as gasoline it is cheaper in the end. One gallon of alcohol will clean ninety 750-watt units with 18-in. bowl reflectors, the process being to dampen a small piece of waste for wiping the lamp and reflector and to follow this with a handful of dry waste. Gasoline or alcohol should not be used on aluminized reflectors, for which the manufacturers recommend only soap and water or a very weak solution of ammonia. It has been found that approximately six minutes are required per unit to clean a 750-watt lamp and an 18-in. porcelain enameled steel reflector, amounting approximately to 75 cents per unit for monthly cleaning. Thus the cost of cleaning is a very small percentage of the total.

In many buildings it is a very good investment to keep the walls and ceilings white, since this increases the illumination by as much as 25 per cent. On this basis it becomes profitable to expend 0.2 per cent of the total annual wage in a shop for keeping up the white paint, assuming a benefit only to the artificial lighting. In modern shops white walls and ceiling are part of the illuminating system, and the maintenance of their color should be included as a part of the allowance for maintaining lighting equipment.

ELECTRICAL EQUIPMENT FOR RAILWAYS

Another interesting report that was presented at the convention was that of the committee on data and information, in which figures covering a large number of steam railroads of the country were submitted. It was shown that, in connection with the electric lighting of steam railroad cars, there had been a decrease during the past year in the use of lead battery cells, while there had been a remarkable increase in the use of nickel-iron storage batteries. The figures also displayed the fact that a large proportion of the axle-lighting generators used for steam railroad cars were now equipped with ball bearings, an increase from 1652 to 5417 having taken place during the year 1916. Also, in the growth of electrically-operated industrial trucks for baggage handling and in freight houses and shops there had been an increase of practically 50 per cent over the number in service in 1915.

A feature of the report was the statement that the number of direct-gasoline-driven, self-propelled cars in service on steam railroads had decreased from 197 in 1914 to 112 in 1916, and while the gas-electric cars in use in 1914 numbered thirty, the number in 1916 was only thirty-two. For electric headlights for steam locomotives the figures showed a slight decrease in use of the arc type and a very marked increase in the incandescent-lamp type, the totals for 1916 being 16,306 arc lamps and 3510 incandescent lamps, as against the 1915 totals of 16,446 and 1287.

The total number of arc lamps in use for shop and yard lighting showed a large increase, but the detailed figures displayed the fact that the number of flaming-arc and Cooper-Hewitt lamps had decreased to a marked degree. The data on incandescent lamps showed that although there had been a big increase in the number of 100-watt vacuum type Mazda lamps, there had been no increase in the larger sizes. The gas-filled type of incandescent lamp, on the other hand, showed a remarkable increase in all sizes.

Another feature of this report was the statement that a total of 192 equipments for electric-arc welding were in service on the steam railroads of the country at the present time. In fact, the widespread interest in this subject was displayed by an elaborate report on electric-arc welding that was made by a special committee. In this it was said that the application of the electric-arc welding process to repair work in locomotive shops was a very profitable proposition, and curves were shown which indicated that the cost of the electric arc was somewhat less than that of the oxy-acetylene flame, these being based on prices of 1 cent per cubic foot for acetylene, and 2 cents per cubic foot for oxygen, while electric power from a 75-volt line was assumed to cost 1 cent per kilowatt-hour.

ELECTRIC VERSUS PNEUMATIC TOOLS

A report on the application of compressed air in repair shops included an extended statement on the relative advantages of electric and pneumatic operation for portable tools. This divided portable tools into two classes, namely, rotating tools such as drills, and reciprocating tools such as riveting hammers. For the reciprocating class the electric tool in its present stage of development seems to have no advantages although there are such tools upon the market. In the case of rotating tools, however, there is a strong competition between the two types.

The pneumatic tool is considerably lighter and, consequently, is easier to handle than the electric machine, the increased weight of an electric drill over a pneumatic drill varying roughly from 10 per cent in the larger sizes to 25 per cent in the smaller. However, the electric tool has the advantage that a portable electric cord is much easier to handle than an air hose, and sometimes it develops that two men with an electric drill will accomplish more than twice as much work as one man with a pneumatic drill.

Efficient operation is the chief advantage that the electric tool has over the pneumatic tool. This is especially the case when the work varies from second to second, a portable pneumatic machine speeding up the instant when the load is removed and thus taking more power as the load is released. Even on continuous full load the efficiency of the electric drill varies from 30 per cent in the smaller sizes to as much as 80 per cent in the larger, whereas the efficiency of the pneumatic tool varies from 18 per cent to 35 per cent. The system of generation and transmission is usually more efficient in the case of electricity than in the case of air, and it should be noted that the instant when current is turned off of the electric tool the demand for energy ceases since there are, of course, no leaks.

In regard to first cost, the pneumatic tool is less expensive than the electric tool. The latter, however, is free from the annoyance that air tools often give by freezing up during the winter time. On the cost of maintenance no accurate figures were obtained by the committee, but it was stated that electric tools would not stand the abuse that could be applied to pneumatic tools. However, where the equipment was not abused, it was considered probable that the maintenance of the electric tool was considerably less costly than that of the pneumatic one.

BUSINESS MEETING

The registration was the largest in the history of the association, and there was an extensive exhibit of railway electrical supplies. The officers elected were: President, C. J. Causland, electrician Chicago Terminal Division, Pennsylvania Lines; vice-presidents, J. E. Gardner, electrical engineer Chicago, Burlington & Quincy Railroad, and L. S. Billau, assistant electrical engineer Baltimore & Ohio Railroad; secretary-treasurer, Joseph A. Andreucetti, Chicago & Northwestern Railroad. The meeting place of the next annual convention is to be Chicago at a date to be set by the executive committee.

Mechanical Design of Electric Locomotives*

Action of High-Speed Steam and Electric Locomotives on Curves Analyzed—Simplicity in Design Vitally Important

BY A. F. BATCHELDER, SCHENECTADY, N. Y.
Member American Society of Mechanical Engineers

THE steam locomotive has what now seems to be natural characteristics to allow high-speed operation in one direction. These characteristics include a low center of gravity at the front end which is carried on the center pin of a two-axle guiding truck. This tends to prevent rolling over and has but little effect on the guiding. Also, there is a high center of gravity at the rear end which is provided with inside journal bearings, allowing the locomotive to roll and increasing the time element, which thus reduces and distributes the lateral pressure against the rail over a longer distance. This increases the vertical pressure on the rail, holding it more firmly in place. These same characteristics can be obtained in electric locomotives by the sacrifice of double-end operation.

However, the advantages gained in operating the electric locomotive in either direction are so important that means should be provided for satisfactory double-end operation. One way of doing this is by using a four-wheel guiding truck at each end of the locomotive. With the use of the extra truck, however, the importance of a high center of gravity largely disappears. The lateral pressure against the rail at the rear end now appears at the truck flanges rather than at the flanges of the driving wheels, and the high center of gravity no longer provides the same increased vertical pressure on the outer rail at the point of the maximum lateral pressure. The lateral stresses from guiding the main frame are taken at the center pins of the two guiding trucks, and the additional vertical pressure on the outer rail is dependent upon the height of their center pins rather than upon the height of the center of gravity of the main frame above the wheel hubs. Thus less advantage is left to be derived from a high center of gravity.

To demonstrate more clearly, it is well to consider what happens to a locomotive when entering a curve, which is also illustrative of its action on tangent track when oscillating from one side to the other inside of the normal clearance between gage line of track and the wheel flanges.

A locomotive with a high center of gravity which is equipped with two driving axles and a four-wheeled swivel truck will serve to illustrate the action. As the locomotive enters a curve, its tendency is to continue on in a straight line, but the flange of the leading wheel gradually comes in contact with the outer rail. This gives the guiding truck an angular motion about its outer rear wheel and exerts a lateral pressure against the center pin, thus giving the main frame an angular motion around its outer rear wheel.

The lateral pressure that tends to displace the rail at the leading wheel is the force required to slip the two inner truck wheels and to accelerate the truck around its outer rear wheel, plus one-half the force required to slip the two leading drivers and the rear inner driver and to accelerate the main frame around its rear driving wheel, plus a portion of the centrifugal force of the whole locomotive.

The lateral pressure that tends to displace the outer rail at the rear wheel of the leading truck is the amount of reaction that comes from slipping the two inner truck wheels and from the angular acceleration of the truck, plus one-half of the force required to slip the two leading drivers and the rear inner driver and to accelerate the main frame around its rear outer driving wheel, plus a portion of the centrifugal force of the whole locomotive.

The lateral pressure tending to displace the outer rail at the rear wheel of the main frame is the amount of reaction that comes from slipping the two leading drivers as well as the inner rear driver and from the angular acceleration of the main frame, plus a portion of the centrifugal force of the whole locomotive.

Because the greater part of the weight is concentrated at the drivers, and because the distance of the truck center pin from the main truck wheels is relatively great, and also because there is but one wheel to take the strain, it follows that the point of the greatest concentrated lateral pressure is at the rear outer driving wheel.

The above disregards the important factor of time in the accelerating and centrifugal forces due to the rolling. This is governed by the height of the center of gravity above the wheel hubs, which tends to reduce the lateral pressure at the rear outer driving wheel. With a high center of gravity the accelerating and centrifugal forces also tend to tip the locomotive up on the outer driving wheels, reducing the weight upon the inner wheels and lessening the force required to slip them. At the same time this action increases the adhesion between the outer rail and tie by the additional weight.

If this locomotive is operated in the opposite direction, the lateral stresses at the wheels are of the reverse order. In this case, the guiding force is applied at the driving-wheel flanges and the reaction taken through the center pin to the truck-wheel flanges. The swivel truck, now trailing, is free to oscillate from one side to the other, and it is possible that the reaction from the force of turning the main frame may be applied at the center pin at the instant when the truck-wheel flanges are tight against the inner rail, allowing the force to accelerate the truck as well as the main frame through the gage clearance to the outer rail. This will add momentum, the value of which depends upon the lateral distance through which the truck is moved, and since the vertical pressure on the rail is limited to the normal weight at the wheels, plus the vertical component of the force that is applied at the height of the center pin of the truck, the relation of the lateral pressure to the vertical pressure at the wheels of the truck may be greatly increased. A number of observations have appeared to confirm the fact that the action of the trailing truck above described is important in producing excessive lateral pressures against the rail in a symmetrically-built electric locomotive with similar trucks at both ends.

REPRODUCING THE ACTION OF HIGH CENTER-OF-GRAVITY SINGLE-END LOCOMOTIVES

It will be seen, therefore, that while the swivel truck is desirable as a guiding agent at the front end, it is not as desirable at the rear end. If it is used at the rear end of the locomotive, means must be provided to prevent oscillation of the truck and to accomplish the same results as the high center of gravity of a single-end locomotive. To accomplish these results, it is necessary to reduce the momentum effect and to reproduce the equivalent of the time-element factor, as well as the equivalent of the increase of vertical pressure on the outer rail.

The momentum effect at the truck can be reduced by providing resistance against swivelling, thus restricting the truck from oscillating from one side to the other of the track, and the amount of this resistance is determined by the allowable force that can safely be applied to the truck when leading. To reproduce the time-element factor, lateral movement can be given to the truck center pin by any of the several methods for giving lateral movement to the leading-truck center pins on steam locomotives. However, the writer has obtained the best results with the method that is the nearest to constant pressure and dead beat, as this also tends to prevent oscillating.

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*Abstract of a paper written for presentation at the annual meeting, December, 1916, of The American Society of Mechanical Engineers, 29 West Thirty-ninth Street, New York.

To increase the vertical pressure on the outer rail, the center bearing of the truck can be made wide, thus allowing the vertical component of the lateral pressure at the center of gravity to be transferred through the bearing to the wheel. Also, with a narrow center bearing the height may be made such that the lateral pressure at that point will result in an increased vertical component independent of the height of the center of gravity.

It is the writer's opinion that the double-end locomotive, while its characteristics are different, can be designed for high speed with a degree of safety equal to that of the single-end locomotive, and this may be done regardless of the height of the center of gravity.

Adaptability to Service Conditions

When the design is such that it is safe to operate at the required speeds and is proper for the curves and other service requirements, and liberal factor of safety is provided for the parts subjected to strain, there are still many other features to be considered in the mechanical details. Thus, reliability in service as affected by the mechanical part of the locomotive depends mainly upon the bearings, their lubrication, and the method of power transmission from the motors to the drivers. It is necessary, therefore, to provide effective lubrication with as few bearings and as simple driving mechanism as the design of the motors will allow.

The power efficiency as affected by the mechanical design is governed largely by the type of the traction-motor support, and the various types may be given the following order in this regard: The gearless motor mounted directly on the axle; the gearless motor mounted on a quill and driving through springs to the wheels; the single-reduction-geared motor; the single-reduction-geared motor driving through gears and side rods to the wheels; the gearless motor driving through side rods and jack shaft to the wheels.

The service time factor is dependent upon the ability of the locomotive to operate under all its service conditions and without undue strains which requires a liberal design of its wearing parts. In addition to this it depends on the simplicity of the design and the ease with which the parts can be inspected, adjusted, repaired or replaced.

The cost of maintenance of the permanent way is a very important item and can be increased or reduced by the design of the locomotive, and the lowest cost is obtained when the locomotive meets its service requirements without undue strains on track, and when the rotating parts are balanced, the weights per axle are suitable for the structures, a suitable equalizing system maintains the proper weight distribution and when provision is made to protect against flange wear.

The cost of maintenance of the locomotive is dependent upon its safety of operation, its adaptability to service conditions, its reliability, its convenience of arrangement, and the same items that enter into its service time factor. It is also governed by the same conditions that affect maintenance of the permanent way.

The first cost of a locomotive will depend largely upon the design chosen, but its importance, except at the time of purchase, becomes of little moment when taking into consideration the foregoing features. With two locomotives designed for the same service the cost of the difference in the efficiency and in the locomotive maintenance alone for one year may, when capitalized, amount to a sum representing a considerable proportion of the first cost of one of the locomotives. In fact, too much importance cannot be given to developing to the utmost the electric locomotive that is the simplest in design and is the highest in efficiency.

In conclusion it may be said that, from the present outlook, the locomotive types that lend themselves best to simplicity and low cost of maintenance are, for high-speed passenger service, the design providing for a gearless motor having an armature mounted directly on the axle, while for freight and switching service the preferred design is that with the single-reduction-geared motor mounted on and geared to the axle.

AMERICAN ASSOCIATION NEWS

Mid-Year Meeting and Dinner Committee

Secretary Burritt announces the full personnel of the committee which will have charge of the 1917 mid-year meeting and dinner at Boston. As stated last week, the date has been tentatively set for Feb. 2. The names of the members of the committee follow:

M. C. Brush, (chairman), Boston; Charles C. Peirce, Boston; Col. T. S. Williams, Brooklyn; E. L. Janes, New York; John J. Stanley, Cleveland; B. A. Hegeman, New York; Myles B. Lambert, Pittsburgh; C. Loomis Allen, Syracuse; C. R. Ellicott, New York; C. P. Dennett, Boston; H. E. Reynolds, Boston; Harlow C. Clark, New York; E. B. Burritt, New York.

Public Service Company Section

The Public Service Company Section has under way a membership contest at the end of which $20 in gold will be awarded by Martin Schreiber, engineer maintenance of way, Public Service Railway, to the man who obtains the largest number of new members between Oct. 30 and Dec. 15. The award will be made at the annual smoker to be held on Dec. 21.

The slogan of the section is "600 Members by Christmas."

Hampton Section Inaugurates Night School Work

The first regular meeting of the Newport News & Hampton Railway, Gas & Electric Company section was held in Newport News on Oct. 20. The committee on night school reported that twenty men had signified their desire to attend such a school and that the first class would be held at once. Reports were received from representatives who had attended the Atlantic City convention as to the exhibits and the company section activities at the convention.

The following officers were elected for the ensuing year: President, E. C. Kelly; vice-president, R. H. Lassiter; secretary, J. W. Howard; treasurer, W. J. Smith.

Denver Tramway Section

The thirty-eighth monthly meeting of the section was held in the company's auditorium on Oct. 19. There were thirty-five persons in attendance.

After the display of a "movie" entitled "Roping a Sweetheart," the annual election of officers for the ensuing year was conducted with the following results: President, W. H. McAloney, superintendent rolling of stock; vice-president, W. M. Casey, superintendent transportation; secretary-treasurer, H. G. Mundhenk, chief clerk, transportation department; director for two years, G. E. Ames, motorman East division; director for one more year, W. E. Casey, chief electrician; director ex-officio, F. W. Hild, general manager.

Following the election, a general discussion concerning the welfare of the section, together with ways and means which might be employed to add to the attractiveness of the meetings, was entered into, many good points and suggestions being offered.

COMMUNICATION

A Plea for Unification of Accounting Classifications

Oct. 28, 1916.

To the Editors:

I have read with interest the address of Homer A. Dunn before the recent convention of the American Electric Railway Accountants' Association, as well as the very able editorial in your issue of Oct. 14 and the comments of W. H. Forse, Jr., in the issue of Oct. 28.

Members of the Accountants' Association realize, more fully than anyone else, the able work done by their representatives in connection with the uniform classifications of accounts for electric railways. Any differences of opinion concerning the handling of certain accounts should not be taken as a criticism of the members of the classification committee, but should be seriously considered with a view of determining whether the suggestions are desirable from a modern accounting standpoint—not necessarily from the standpoint of electric railway accounting as heretofore practised, but from the standpoint of principles of general accounting for all utilities.

Mr. Dunn touches on some inconsistencies but does not, in his short paper, mention all differences between the electric and steam railway classifications. It is not expected that all accountants will agree with everything said by Mr. Dunn, but there are points brought out by him which should be discussed frankly and with all seriousness. A comparison of the electric railway classification adopted in 1908 with the classification adopted in 1914, shows many differences and improvements in the latter classification. Why should we not be willing to continue improving our classification by discussing all points in a free and open manner? If steam railway accountants have suceceded in handling certain items in a more correct manner than electric railway accountants, the latter should be willing to acknowledge the improvement and modify their methods accordingly. If electric railway accountants handle certain items more correctly, steam railway accountants should be willing to change their methods to conform to the better practice.

Steam railway accountants, I regret to say, have almost entirely ignored the existence of an Accountants' Association connected with the electric railway industry, notwithstanding the fact that the amount of capital invested in electric railways necessitates expert accounting, and some electric railway accountants are just as competent and able as accountants of steam railways. On the other hand, there has been a disposition on the part of some electric railway accountants, as soon as steam railway methods are suggested, to make objection to their adoption, apparently for the reason that the method is a steam railway method and was not originated by electric railways. I do not say that this is the case in all instances, but I have noticed this disposition a number of times.

It is understood that the Interstate Commerce Commission has desired for many years to make the steam and electric railway classifications as nearly uniform as possible, and the electrification of portions of many steam railways would seem to constitute an argument for uniformity, although it is asserted by some that the electrification is, after all, only a change in motive power. If this is granted to be the case, however, it would seem desirable that two companies operating the whole or a portion of their lines with the same motive power should keep their accounts in a uniform manner. I have never felt that a satisfactory classification for both steam and electric railways could not be devised. The large number of operating expense accounts necessary in a consolidated classification would be practically the only objection. This is not a valid one, because a number of accounts would not be used by electric railways because of the nature of their business, and a number of other accounts would not be used by steam railways. But this is a matter which depends on the wishes of the Interstate Commerce Commission and the wishes of the owners of electric and steam railways, who may or may not desire the information given them to be uniform.

A very serious question for accountants to consider, however, is the different classifications required by the various railroad and public service commissions of the several states. A number of states have adopted as standard the Interstate Commerce Classification, but others have their own views and insist upon practices which may or may not be more desirable than the Interstate methods. It would be a great advantage to all if it were possible for the American Electric Railway Accountants' Association to recommend a classification which could withstand the attacks of all accountants and prove satisfactory to all commissions.

What we accountants have to deal with is the present system of accounts, and we should all be willing to receive suggestions from every source, consider each carefully, and recommend and adopt such changes as may seem best, regardless of whether or not it necessitates a change in our former methods. The closing sentences of your editorial of Oct. 14, are so admirably expressed that I repeat them here:

"Whether the future may bring actual changes or not, however, it is vitally necessary that the members of the Accountants' Association continue to hold an open mind on the subject, and that in mutually felicitating themselves as to past accomplishments they do not neglect to consider with all seriousness the best in modern accounting, wherever developed or by whomsoever suggested. Blind worship of the past or a Pharisaic attitude of superiority would only dim the luster of past accomplishments."

"ACCOUNTANT."

Navy Yard Power Plant Inspector

The United States Civil Service Commission announces an open competitive examination for an electrical engineer to supervise the operation of all the navy-yard power plants. He should also be able to give expert advice upon, and be responsible for, the design of new projects for the economical distribution of power. Graduation with the degree of mechanical engineer or electrical engineer from a college of recognized standing and at least ten years' subsequent experience in responsible charge of a central electric power station are prerequisites for the position, which pays $12.48 per day. Applications should be filed with the commission by Nov. 14.

Some Recent Advances in

EQUIPMENT AND ITS MAINTENANCE

Convenient Gage for Cutting Rubber—Riveting and Welding Track Joints for $2.55 Each—Maintenance of Coasting Recorders—A Two-in-One Car—Recent Design of Underfeed Stoker—Other Items of Practical Interest

One Car Made from Two

At About $1,500 per Unit the United Traction Company Is Converting Pairs of Single-Truck Cars into Double-Truck Center Door Cars for Rush-Hour Service

High platform expense and greater liability of platform accidents have made the old-style car obsolete from the operating standpoint, no matter how sound its construction and equipment may be. Appreciating this fact, the United Traction Company, Albany, N. Y., has begun to convert pairs of its single-truck cars into center-door cars with modern safety and traffic accelerating features. This change has more than doubled the seating capacity per unit, thereby affording better service for the rush-hour conditions for which these cars will be used.

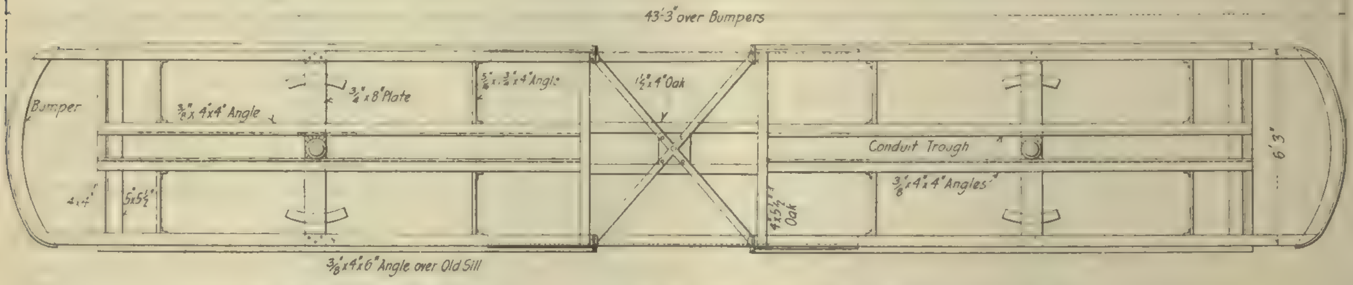
The first unit, completed during July, 1916, was made up of two 18-ft. cars. Fifty-seven 20-ft. cars and seventy-one cars 18 ft. long are also available for rebuilding. Each of these cars is of the single-truck type and has a seating capacity of twenty-four, whereas the center-entrance unit seats fifty-one on the same basis of 18 in. per passenger. All seats are longitudinal. The first of these rebuilt cars, now in use on the Pine Hills line, has the following general dimensions and weights which will be approximately the same in future cars of this type that are built.

Length	43 ft. 3 in.
Weight	35,000 lb.
Seats	51
Total passengers	100
Weight per passenger, seated load	686 lb.
Weight per passenger, total load	350 lb.

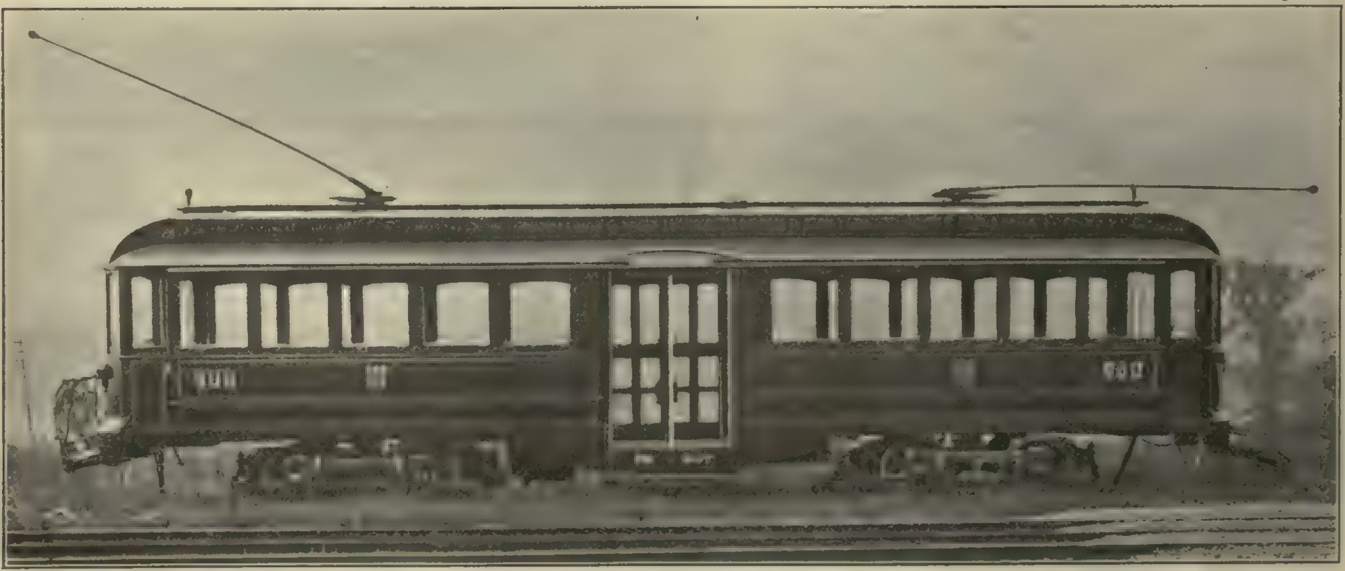
The first of these cars was constructed at a cost of $1,740. The cost of future units, however, will approximate only $1,500, the cost of the first having included patterns, experimenting with various details in the design and other items peculiar to any new construction.

The Reconstruction

The original cars were stripped of their platforms and bulkheads, and each body was shortened one window by cutting through beyond the platform knees at the ends to be spliced. The roof, however, was not disturbed as it was left to be dovetailed over the well of the rebuilt car. While the roof and sides of the cars were salvaged, a new underframe was necessary. The principal

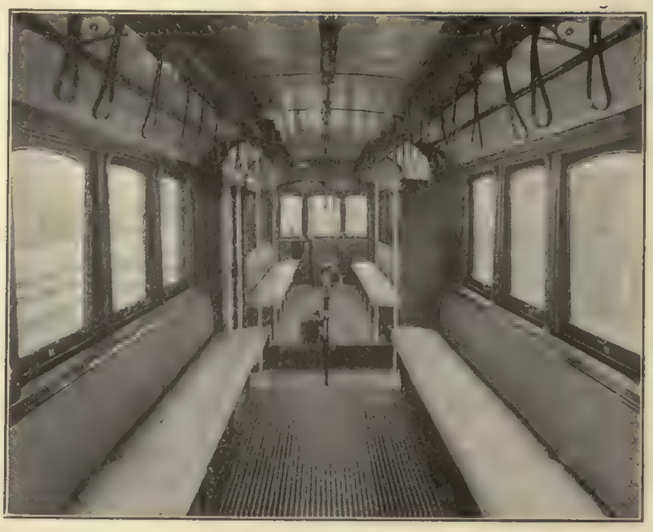


UNDERFRAMING OF REBUILT CAR SHOWING THE TWO SECTIONS SPLICED TOGETHER



ALBANY (N. Y.) REBUILT CAR MADE OF TWO SINGLE-TRUCK UNITS

CAR BODIES READY FOR RECONSTRUCTION



INTERIOR VIEW OF CAR

BILL OF MATERIAL AND LABOR FOR REMODELLING CARS

234 ft. ⅝-in. whitewood
172 ft. 1-in. oak
128 ft. 1-in. white pine
282 ft. 4-in. ash
63 ft. 2-in. ash
240 ft. 1½ in. ash
80 ft. 3-in. oak
61 ft. 1-in. ash
25 ft. 3-in. ash
262 ft. 4-in. oak
152 ft. 2-in. oak
44 ft. 1¼-in. ash
53 ft. 2-in. spruce
120 ft. 1½ in. cherry
13 ft. 1-in. cherry
688 ft. 13/16 in. yellow pine flooring
408 ft. 13/16 in. corrugated maple flooring
140 ft. 1-in. maple flooring
750 ft. ⅜-in. basswood roofing
Six ½-in. x 2-in. step irons
15 yd. 54-in. canvas
15 yd. 72-in. canvas
3 lb. tacks
4 gross 1½-in. No. 10 flat head, bright screws
3 gross 1-in. No. 14 flat head, bright screws
1 gross 1¼-in. No. 14 flat head, bright screws
1 gross 1½-in. No. 14 flat head, bright screws
1 gross ¾-in. No. 10 flat head, bright screws
1 gross 1-in. No. 10 flat head, bright screws
1 gross 1½-in. No. 10 flathead, bright screws
1 gross 1¼-in. No. 10 oval head, brass screws
4 gross 1-in. No. 9 flat head, bright screws
1 gross 2½-in. No. 20 flat head, bright screws
1 gross 1-in. No. 10 oval head, brass screws
1 gross ¾-in. No. 9 oval head, brass screws
3 gross 1-in. No. 14 round head, blue screws
1 gross 1¼-in. No. 14 round head, blue screws
1 gross 1½ in. No. 14 round head, blue screws
24 ft. ¾-in. round iron
8 ft. ½-in. x 2-in. iron
42 ft. 1-in. black iron pipe
56 ft. ¾-in. black iron pipe
70 ft. 4-in. x 4-in. angle iron
42 ft. 1½-in. x 4-in. channel iron
100 ft. f-in. x 6-in. angle iron
56 ft. 2½-in. x 2½-in. angle iron
60 lb. 3½-in. safety treads
4 sheets ¼-in. x 19-in. x 3-ft. 6-in. sheet steel
11 sheets No. 18, 36-in. x 96-in. sheet steel
2 sheets No. 14, 24-in. x 84-in. sheet steel
16 ft. 1½-in. band iron
68 ft. ⅞-in. half-oval iron
Four brass transom catches
Six 2-in. x 2½-in. brass butts
Twelve 3-in. x 2½-in. brass butts
8 lb. ⅝-in. x 4½-in. coach screws
10 lb. 13/16-in. flat washers
12 lb. No. 6 wire nails
4 lb. 1-in. flat head, wire nails
1 lb. 1¼-in. flat head, wire nails
Seventy ⅝-in. x 5½-in. machine bolts
Sixty ⅝-in. x 5-in. machine bolts
Thirty-two ½-in. x 6½-in. machine bolts
Twenty ¾-in. x 2-in. machine bolts
Eight ⅝-in. x 1½-in. machine bolts
Eight ¾-in. x 11-in. machine bolts
Twelve ½-in. x 1½-in. machine bolts
Twelve ⅝-in. x 10½-in. machine bolts
Four ⅝-in. x 11-in. machine bolts
Thirty-two ¾-in. x 3½-in. machine bolts
Twelve 1½-in. x 8-in. machine bolts
Eight ⅝-in. x 2-in. machine bolts
Eight ¾-in. x 8-in. machine bolts
Fifty 5/16-in. x 2-in. carriage bolts
Twenty 5/16-in. x 4½-in. carriage bolts
Twelve 5/16-in. x 3-in. carriage bolts
Eight ½-in. x 7-in. carriage bolts
100 ¼-in. x 2½-in. stove bolts

Labor on Each Car

Carpenters	1,350 hours
Machinist	100 hours
Blacksmith and helpers	150 hours
	1,600 hours

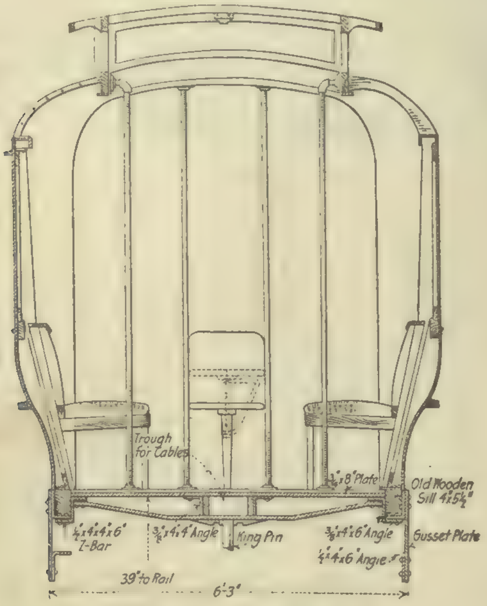
members are a pair of ⅜-in. x 4-in. x 4-in. angles which form a pair of center sills running up to the sides of the well. These angles with the aid of nailing strips form a trough 11 in. wide to carry the rubber-lined canvas hose which is used for conduit. Although the monitor roof was retained, it was modernized from the ventilation standpoint by installing twelve automatic ventilators. The interior was thoroughly renovated to dispel the gloomy aspect of the old cars.

These cars are unusually narrow, and the desire to use the available trucks and motors made it impossible to adapt stepless construction. However, by using 30-in. wheels the entrance steps were kept within 15 in. The well has a riser of 11 in. The folding doors and steps

TWO CAR BODIES SPLICED TOGETHER

TWO SINGLE-TRUCK CARS WITH PLATFORMS STRIPPED OFF are operated in unison by hand from an unusual stanchion made by the United Traction Company. This stanchion has but one stem for the handles used to operate the doors on both sides of the car. Furthermore, the stanchion has a swiveling feature by which the Dayton fare box can be swung around to the operating side with but half a turn.

The use of original longitudinal seats for this narrow car permits high speed in passenger handling. Additional bench seats are let down alongside of the idle center doors, and there is a seat for one passenger back of the motorman's seat. The National Pneumatic Company's interlocking safety door control is to be installed on these cars at an early date. This control, through reducing standing time, has cut the running time on the Albany line where it is already in use 8 per cent.



SECTION VIEW OF REBUILT CAR

The first unit is mounted on available Brill 27-G trucks; the four next units will be mounted on available Taylor trucks. These trucks are of 4 ft. 6 in. wheelbase. Each unit is fitted also with four Westinghouse 12-A motors and two K-35 controllers. Only the General Electric air brakes with CP-27 compressors are new.

Before going back into service the cars will be finished off neatly by painting them with the company's standard colors according to the five coat, six to eight-day system.

The accompanying illustrations show the cross-section and the underframing of the car and the different steps in its construction. The material required in this work is shown in the tables on page 981.

A Riveted and Welded Track Joint of Low Cost

The Cost of This Joint Is About $2.55 Complete for 7-in., T-Rail

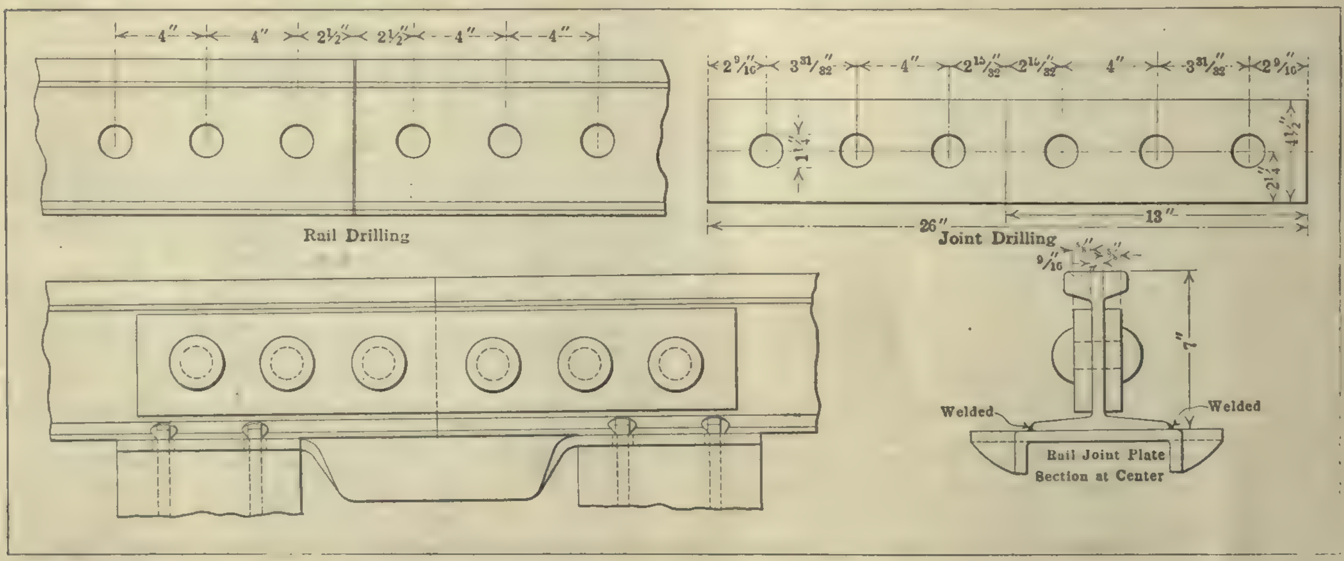
BY D. P. FALCONER
Engineer Maintenance of Way New York State Railways, Rochester Lines

For the last two years or more this company has been using a type of riveted and welded joint that has proved both smooth riding and durable, while at the same time it is quite inexpensive. Its construction is shown in the accompanying illustration.

Briefly, the joint consists of a pair of plates riveted when hot to the web of the rail, and a joint plate placed under the base of the rail and welded to it. The holes in the plates are drilled on shorter centers than those in the rail, the difference being about 1/8 in. between extreme holes. Before application the plates are heated so that the holes register with those in the rail and they are then riveted in place with 1 1/8-in. rivets, six in all. In Rochester the riveting is done with a pneumatic riveter or "air gun."

The purpose of the application of the plates in a heated condition is to produce, on cooling, a powerful force drawing the ends of the rails together. If the ends are in contact before the application of the plates they are drawn together with a powerful force after the joint has cooled and this keeps the plates in tension. If there is an initial opening between the rail ends, shims are inserted to insure this tension. The plates used are of mild steel which has been found to be amply strong both for this purpose and for the rivets.

To support the joint the Abbot joint plate is used with wood ties, while with steel ties the ties themselves are utilized for this purpose. The illustration shows how the Abbot plate is employed. When the joint is cold the base of the rail is first spot welded to the plate at the ends and the middle for the pur-



ELEVATIONS AND DETAILS OF RIVETED AND WELDED JOINT USED BY NEW YORK STATE RAILWAYS, ROCHESTER LINES pose of preventing the setting up of internal stresses which would result from the heating of the metal if the attempt were made to join the base of the rail continuously to the joint plate all at once. After spot welding the edge of the rail base is welded to the plate from end to end of the latter. The electric arc is used for this purpose.

From our experience we find that the cost of applying this joint in lots of fifty to Lorain section 91-375 7-in. T-rail is practically as follows:

Abbot plate	$0.77
Welding steel	.10
Two bars	.60
Six rivets	.21
Rivetting	.51
Welding	.26
Moving equipment to job	.10
Total	$2.55

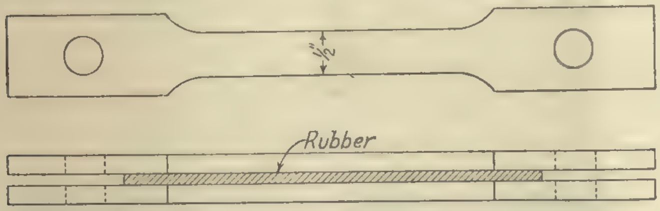
In addition to the advantages of this joint already enumerated a point that appeals to us is that this joint carries the wheel load across the joint with a base support, a fact which gives it smooth riding qualities. The ends of the rail are pulled together so tightly that the writer has at times had difficulty in locating the joints. The original feature of this joint by which the joint plates are held in tension were made the basis of letters patent which have been granted to E. J. Cook and the writer. The Lackawanna Steel Company showed an example of the joint at the Atlantic City convention. As the track men in attendance seemed interested in it the above description has been prepared at the suggestion of the editors of the ELECTRIC RAILWAY JOURNAL.

Easily-Made Gage for Cutting Rubber Accurately

BY G. H. MCKELWAY

Line Engineer, Brooklyn Rapid Transit Company

While many of the specifications for rubber insulated wire call for a tensile test on the rubber of perhaps 800 lb. per square inch, yet this test, as generally made, is only an approximate one. The reason for the failure to obtain accurate information as to the strength of the rubber is due not to the instruments used in making the tests, but to the difficulty in cutting the rubber to the exact width at its narrowest point. This, of course, is the point at which it almost always fails.



GAGE MADE OF TWO THIN METAL STRIPS FOR CUTTING RUBBER ACCURATELY

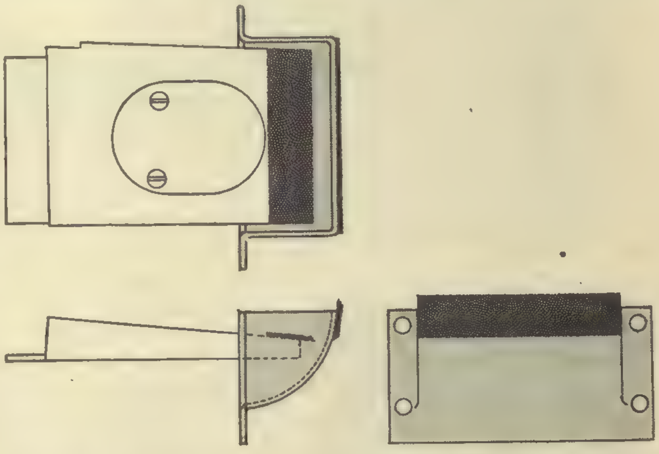
In order to overcome this difficulty one of the large rubber companies is now using the gage shown in the accompanying illustration. As may be seen, this is a simple and easily-made gage, consisting of but two small thin strips of metal with holes at the ends through which the bolts pass for clamping the strips tightly over the sample of rubber. As the width of the narrowest portion of the gage is just ½ in., the rubber, when placed between the two portions of the gage, can be cut easily to the exact width with a sharp knife, and it is then ready for test.

Maintaining Coasting Recorders on the Long Island Railroad

BY GEORGE H. BLACKWEDEL

Inspector Long Island Railroad, Morris Park, L. I.

As the cost of power is one of the largest items included under operating expense, the Long Island Railroad, in order to determine carefully the amount of energy saving possible with coasting recorders, placed in service ten Rico coasting recorders in 1910, twenty-five more in 1912, and an additional twenty in 1915, all of which have proved satisfactory. Of these fifty-five coasting recorders, fifty are in service in combination passenger and baggage cars, and five in the smaller equipments. As most of the trains are equipped with the combination passenger and baggage cars, this number of recorders practically covers a large percentage of the mileage of the entire road.



PIECES OF HACKSAW BLADE INSTALLED ON THE EDGES OF THE PAPER GUARD AND PAPER CHUTE

One inspector does all the maintenance work required on the recorders in addition to his regular work, the tape renewals and the making of minor repairs being taken care of at the different inspection points. All records, percentages and clerical work are handled by the operating department.

In cases where records show a recorder to be out of order the mechanical department is notified through the department handling the records. The recorders are inspected periodically, approximately monthly. The adjustment of the magnets is checked by means of a voltmeter, an adjustable resistance and two dry cells. The magnets are set to pick up the operating lever at 1.2 volts, and to drop it at 0.4 volt. The clock mechanism is checked by means of an ordinary stop watch. Through the adjustment made on the magnets, the recorders are made to cut in at the speed of 4 m.p.h. or more. Little if any difficulty, however, is experienced in keeping the machines in adjustment.

The coasting recorders as originally received from the makers were equipped with 2-amp. fuses. It was found that these blew frequently, due to the peculiarities of the motors, and 10-amp. fuses were accordingly adopted as a standard. These seldom blow, but when they do it is usually the result of the motors having been reversed, or of trouble with them.

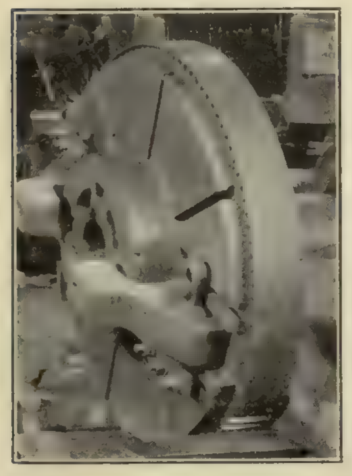
For a long time trouble was experienced with the paper tape sticking, and when this occurred the paper chute became clogged. As many as fifty-nine cases of this kind were reported in one month. This trouble was remedied by installing pieces of hacksaw blades, with sharp edges, on the edges of both the paper guard and the paper chute as shown in the above sketch. These are so arranged that no matter how the paper is torn in removing it from the recorder, it will always tear clean and keep the chute from being clogged. By this method the number of paper troubles for the last few months has been reduced to four. All recorders are equipped with this improvement.

The relays are overhauled every six months, new residual pieces being fastened to the armature, the contacts filed and renewed where necessary, the air cylinders cleaned and oiled, and all contacts, terminals, etc., are examined and tightened. It is found that this inspection is ample to keep the relays in first-class condition. All defective recorders have a small copper tag, marked "out of order," inserted between the cover and the clock movement, in such manner that the stamping key cannot be inserted.

Wheel Turning Operation Improved

Time Required to Set Up the Work and Turn the Wheels Is Reduced by Use of Lugs of Special Design

There are many different methods of holding car wheels in a lathe while they are being turned, and each method no doubt has its advantages. The accompanying illustrations show the heavy lugs which have been designed for this purpose and a pair of wheels set up in the lathe ready to be turned. The pictures were taken in the Madison Street shops of the Lehigh Valley Transit Company. Harry Branson, superintendent of equipment of the company, is responsible for the design of the lugs and the method of turning the wheels.



LATHE FACE-PLATE SHOWING LUGS FOR HOLDING WHEELS

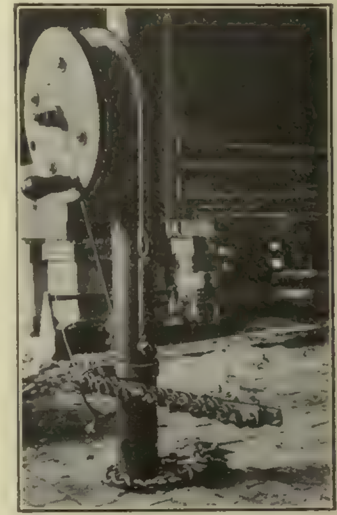
In operation two lugs are securely bolted to each face-plate. The axle on which the wheels are mounted is set into the lathe and accurately aligned by the lathe centers. The wheels fit over the outside of the lugs to which they are fastened by ¾-in. bolts. The tightening of these bolts clamps the wheels firmly against the lugs, thus stiffening the axle and at the same time providing a means of driving the pair of wheels. The arrangement is so rigid that the two wheels can be turned at the same time and all chattering is eliminated.

Before these lugs were devised it was a difficult matter to hold the wheels in the lathe firmly while the turning operation was being performed, and it required two days to turn one and one-half pairs of wheels. By the use of the lugs six pairs of wheels can be turned out in a day.

PAIR OF WHEELS SET UP IN LATHE READY TO BE TURNED

Home-Made Armature-Banding Tensioner

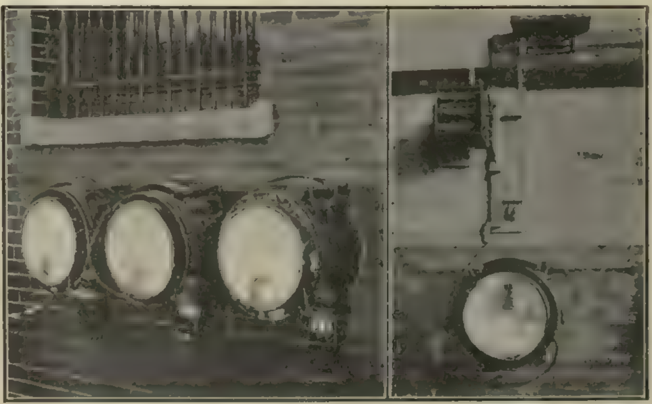
A home-made device which provides about 250-lb. tension in the armature-banding wire, has been constructed by the mechanical department of the Galesburg Railway, Lighting & Power Company, Galesburg, Ill. This tensioner consists of sixteen steel spools, 1 in. in diameter, mounted on bearings set on a steel bar at 1½-in. centers. As shown in the accompanying illustration, this bar is bent to form a clamp around a pipe standard. The wire is threaded through the spools in the usual manner, and thirteen spools are used to obtain 250-lb. tension in the banding wire. The supply of banding wire is contained on a reel mounted on the pipe standard above the tensioner. In order to obviate the slack wire between the reel and the tension spools, a bell cord is placed in a groove cut in the periphery of one of the sides of the reel and attached by a spring to the standard.



HOME-MADE ARMATURE-BANDING TENSIONER

Sand-Blasting and Testing Headlights

On the Portland (Me.) city and suburban lines of the Cumberland County Power & Light Company the glare of headlights is being virtually eliminated by sand-blasting the glass fronts, as shown in the accompanying illustration. The headlights are of Crouse-Hinds design, and are combination arc and incandescent units. The glass fronts are 12 in. in diameter. At the bottom of the glass a clear area of parabolic shape, about



SAND-BLASTED HEADLIGHTS ON RACK AT CARHOUSE; HEADLIGHT TEST SET INSTALLED ON WALL OF CARHOUSE

4¼ in. high and 4½ in. wide is left to provide an unobstructed outlet for the light from the incandescent unit used in downtown service. The headlights in the illustration are supported on a 3/16-in. x 1-in. x 6-ft. strap-iron rack attached to the outside brick wall of the carhouse by strap-iron braces, the location enabling trainmen to obtain them with minimum loss of time when the late afternoon runs begin.

A permanent test circuit for electric headlights is installed in this property, as shown in the accompanying illustration. The headlights are hung on a narrow bar of strap-iron which is grounded. The positive line from the shop trolley is brought down to about 6 ft. above the floor and wired to a terminal, an inclosed fuse, snap switch and resistance being included in the feed.

Horizontal-Retort Underfeed Stoker with Novel Features

While the general principle of using horizontal-top retorts fed by horizontal rams, as is done in the new Moloch underfeed stoker, represents no innovation, this make of stoker embodies some details of construction which are rather ingenious. Among them are the use of rotary grinders parallel to each retort for disposing of the ashes and stirring up the fire; arrangements for minimizing the strains in parts subjected to excessive mechanical stresses and intense temperatures, and provisions for economically controlling the fuel feed.

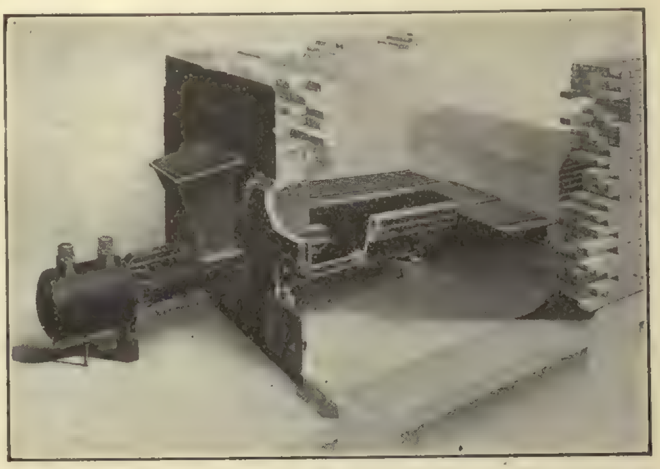
As shown by the accompanying sectional views, the stoker is made up of units, each consisting of a horizontal-top, V-shaped retort, along the upper edges of which are mounted tuyere blocks, through which air is supplied under pressure. Fuel is fed into the retort by a steam-operated ram, which is supplied with coal from a hopper attached to the ram case outside the furnace. Between each retort and along each side wall, where the products of combustion are deposited, are rotary grinders which are operated intermittently in the same manner as the fuel-feeding mechanism. The frequency of operation, as well as the relative amounts of rotation of each grinder can be varied as conditions require.

Two methods of stoker control may be employed: One is to actuate the steam-cylinder valves by steam and the other is to control them by solenoids. In either case the master control is attached either directly or indirectly to the fan prime-mover, so that fuel is fed into the furnace at a rate proportional to the air supply. When steam control of the fuel feed is employed the fan mechanism operates a pilot valve controlling the steam inlet and exhaust parts. With electrical operation the fan actuates a contactor, which in turn performs the previous-mentioned operations by means of solenoids. The master control shuts off the steam supplied to the ram cylinders after a certain portion of the piston stroke is completed, so economical steam consumption is assured. Main steam and exhaust headers are placed in a trench beneath the stoker cylinders to simplify piping and reduce radiation therefrom.

On account of the intense heat and severe expansion and contraction stresses to which the retort walls are subjected, they are made in sections, thus eliminating the necessity of replacing large parts when defects occur. The lower section of the retort is divided into a large front and rear section, and the upper part into sections 20 in. long. All parts are closely fitted and the sections firmly bolted together and well ribbed to prevent cracking. Any section which becomes cracked will remain in position for service, and can be replaced without disturbing any other section.

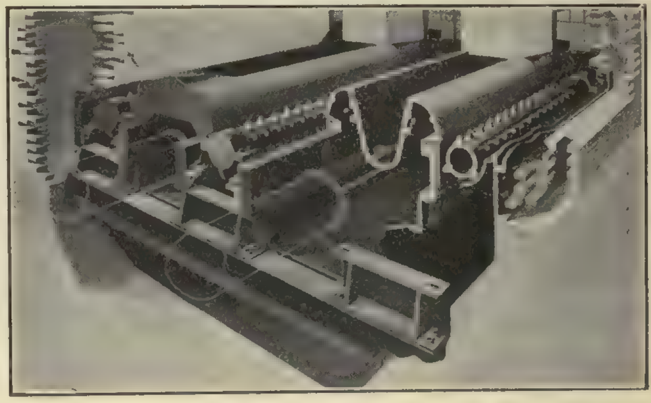
The retorts are supported on each side throughout their entire length to allow for expansion without injury. The air boxes which are made of cast-iron plates are attached to and hung from the retort supports, and are built in sections with removable bottoms.

The tuyere blocks consist of heavy castings which are locked in place, the surface which is in contact with the fire being provided with fins on the under side. These serve the double purpose of absorbing heat from the fire and dissipating it to the incoming air. The lower edges of the stokers are attached to an angle iron which extends across the entire furnace, thus preventing the stoker movement from bulging the boiler front, and allowing for expansion and contraction. The fire doors are equipped with cast-in-place fire-brick linings, to avoid the trouble sometimes caused by brick becoming loose and falling out.



CYLINDER OPERATING FUEL RAM AND INTERIOR OF FURNACE

The one-ended cylinders with steam ports cast in the walls are employed to permit the use of short and simple steam connections. By removing the cap screws fastening the cylinder to the ram case the entire coal-feeding portion of the stoker may be dismantled. Upon the cylinder being removed, the piston, stuffing box, gland, piston rod and ram can be withdrawn and the stoker exposed for inspection or renewals. All valve bodies are interchangeable.



PERSPECTIVE SECTION RETORT AND ASH REMOVER

For small installations the Moloch stoker is made in the manually-cleaned type. With this or the self-cleaning type as many stokers can be combined under one boiler as the space and conditions require. Their installation is not confined to new boiler equipment, as no special brick work or fire arches are required. Where a basement exists for the storage of refuse or ash, the design can be readily altered to receive the stokers. Where a basement or ash tunnel does not exist, a pit directly under the boiler furnace can usually be arranged. On account of the fuel bed being horizontal the boiler does not have to be set as high as with an inclined fuel bed. Where possible, however, a relatively high setting is recommended by the manufacturer.

This stoker is manufactured by the Moloch Stoker Company, Chicago, Ill.

Sand Blasting Makes Scrap Glass Usable

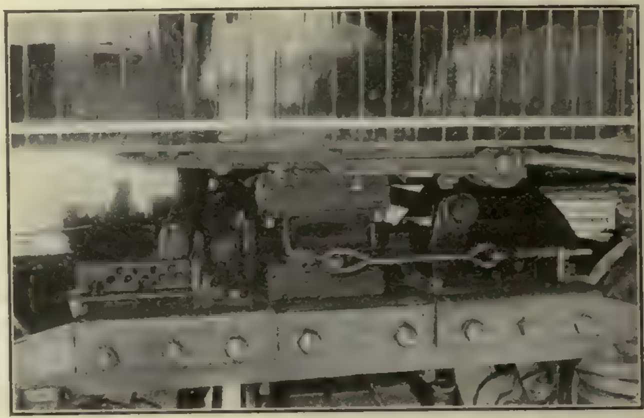
The portable sand blasting plant installed by the Northern Ohio Traction & Light Company, Akron, Ohio, in addition to performing its usual functions, has been found to be useful for making clear scrap glass usable. Both clear and Florentine glass are used in this company's cars, the latter serving exclusively in the deck sashes and door panels. Since both of these are of small dimensions, it frequently occurs that there is clear scrap glass which could be used at these points if it were chipped. The chipping is accomplished by applying one coat of cheap glue to the sand-blasted clear glass. The glue in drying curls and chips the surface of the glass, and to hasten this drying process electric heaters are frequently used. The margins of this chipped glass are left sanded and, in some instances, as in the case of the door panels, the lettering is sand blasted on the glass. This sand-blast equipment is also used for lettering clear glass, for such signs as "Have Your Fare Ready," "No Smoking," "Passengers Must Not Talk to Motormen," or any others which may be readily displayed on the sashes and glass door panels.

At first a home-made sand-blasting outfit was provided, but so many useful things could be accomplished by sand blasting that a special outfit was purchased from the American Foundry & Equipment Company. As a general proposition the sand-blasting is done in a building especially provided for that purpose, which is shown in the accompanying illustration. All work that can be brought to the sand-blasting plant is handled in this building, but when it is necessary to sand-blast cars in the paint shop the outfit is moved to that point. The operation of the sand-blasting equipment is in charge of the upholsterer, as it is only required two or three days a month. Whenever the stock of sand-blasted or Florentine glass becomes low, he replenishes it, and as occasion demands, performs other sand-blasting operations.

SAND-BLASTING PLANT OF NORTHERN OHIO TRACTION & LIGHT COMPANY

Overhauling of Old-Style M.C.B. Trucks

Better operation has been obtained at a reduced maintenance cost by embodying several improvements in overhauling a number of Brill-27 M. C. B. trucks used by the Northern Ohio Traction & Light Company, Akron, Ohio. One of these changes included cutting out the radius bar and substituting a bar between the upright brake levers or at a point much closer to the bolster. The brake pull-rod was extended to connect to this new bar with a clevis and 1¼-in. pin bearing. This type of connection was substituted for the old-style wheel and clevis attachment to the radius bar. This change permits more flexibility in rounding curves and obviates the worn pull-rod wheels. Moreover, the brake rigging is now clear of the trucks and does not become damaged when a switch is split accidentally. At the same time, this arrangement reduces the friction in these working parts of the brake rigging, eliminates the release springs and thereby obviates their maintenance. The old brake levers were used in making this change which also permitted a 300-lb. reduction in the weight of the truck. These features may be observed in the accompanying illustration.



NORTHERN OHIO TRACTION TRUCK IMPROVEMENTS—VIEW OF TRUCK SHOWING MOTOR LEADS, DAMPENER AND CHANGED BRAKE RIGGING

A dampener attached to the truck and bolster of single-end cars was another improvement provided at this time. This fixes the relative position of the bolster and the truck, eliminates wear on the chafing plates and improves the riding qualities. It is also shown in the illustration. The arrangement of the motor leads were changed by bringing them out at the top No. 1 and No. 4 motors and placing them in ¾-in. rubber hose for protection against chafing and the weather. The leads from No. 2 and No. 3 motors were carried down under the bolster instead of over or through it, and they are brought up between the motor and the bolster at a point near the king bolt. This arrangement permitted the cable leads to be drawn up tightly, no slack being required because the leads are so close to the king bolt.

A standardized system of piping all the cars of the Northern Ohio Traction & Light Company greatly facilitates making repairs and thereby reduces the cost of doing this work. All cars of the same type are piped in a standard way and to a standard dimension. In case of a break in any portion of the pipe system, it is possible to cut a new section of pipe at the general shop and send it to a running repair shop anywhere on the system for replacing. Furthermore, those sections needed in replacements frequently can be carried in stock at the different carhouses.

NEWS OF ELECTRIC RAILWAYS

SUPREME COURT UPHOLDS RAILWAYS

Illinois Body Reverses Arbitrary Commission Order Requiring Companies to Suspend Rates Increased Before Utility Law Went Into Effect

A peculiar case arising under the terms of the Illinois Public Utilities Commission law has been decided by the State Supreme Court in favor of the railways involved, the court holding that the commission had no power to suspend without investigation and formal finding rates first filed with it, even if these rates did include an increase made before the utilities law went into effect. The case arose as follows:

On Dec. 30, 1913, the Chicago & West Towns Railway and the Suburban Railroad, operating under the same management, made an increase in their rates which became effective on Dec. 31, 1913, and in January, 1914. they filed with the commission their schedules showing all the rates then in force. The public utilities act went into effect on Jan. 1, 1914. On March 27, 1914, the commission issued a general order stating that any increase in rates after July 1, 1913, were illegal unless they had been consented to by the commission, and that any utility so increasing its rates must return to the old rates and continue them in force until the commission had given its consent to the proposed changes. In the cases in point, however, the increased rates were continued in force by the two companies until October, 1914, when the commission directed them to return to the fares in effect on July 1, 1913, until the commission could fix just and reasonable rates. A petition for rehearing was overruled by the commission. The companies then appealed to the Circuit Court of Sangamon County, and the order of the commission was affirmed. The companies then prosecuted an appeal to the Supreme Court of Illinois.

The Supreme Court, in its reversal of the judgment of the Circuit Court, says that it was the first duty of the commission to determine what were reasonable and just rates to be charged passengers riding on the cars on the appellants' lines. The commission in its order in the case clearly set forth that it could not determine, under the evidence offered, what was a just and reasonable rate until further evidence was introduced, and it continued the case for further evidence without finally disposing of it. This order it had the right and power to make, but it did not have the right or power to make the order requiring the appellants to return to the schedules of rates of July 1, 1913, before or pending the determining of the issues in the case. The commission was without authority to make such an order except upon a full hearing and a finding upon the evidence that the old rate of July 1, 1913, was a just and reasonable rate.

The decision of the court on this point is based on the fact that the public utilities act did not take effect until Jan. 1, 1914, and the commission had no legal existence before this date. Therefore it had no authority to prevent the placing into effect of increased rates made previous to this date. It could, of course, proceed to determine whether or not such rates were just and reasonable and order reparation if necessary, but it had no power to nullify these rates until it was established that they were not just and reasonable. After the law became operative no change in rates could be made without good cause shown and a finding of justification by the commission, and pending this finding the proposed change could not be put into effect, but the law did not contemplate that the original schedules should not go into effect pending a hearing.

In answer to a charge of violation of Section 4 of Article II of the State constitution by the public utilities act the court holds that that provision is simply a limitation of the general powers of the Legislature, and in one particular only. This provides, in substance, that the Legislature may not grant the right to construct and operate a street railroad within a municipality without requiring the consent of the local authorities having control of the streets or highways proposed to be occupied. This section of the constitution does not, by implication or otherwise, attempt to divest the State of its paramount authority and control of streets and highways. It is equally clear that this section of the constitution does not deprive the Legislature of its power to fix rates for such companies. The power of the State to regulate the rates that may be charged by railroads and other carriers cannot be successfully questioned, and this regulation may be carried on by means of a commission.

PREPARING FOR STRAW VOTE IN DALLAS

Consolidation of Railways and Reorganization of Lighting Company Hinge on Vote to Be Taken During Week of No. 6

Only two points remain to be settled before the straw vote is taken in which the voters of the city of Dallas, Tex., are expected to settle the traction and electric lighting problems of the city. The proposed consolidation of the street railways of Dallas and the reorganization of the lighting company hinge upon the result of this straw vote. If the voters approve a valuation of $8,500 000, as asked by the street railway companies, instead of the valuation of $7,100,000 as fixed by E. W. Bemis, utility expert, the proposed consolidation is expected to be put into effect at once.

Two points remain to be settled before this straw vote is taken. They are the fixing of the valuation of the new interurban terminal building in Dallas, which is said by the owners to be worth $1,500,000, and the examination of the lease executed by the Northern Texas Traction Company, by which the consolidated street railway company, headed by J. F. Strickland and C. W. Hobson, and backed by the General Electric Company, will take over the Oak Cliff lines and operate them under one management with the lines in the city of Dallas proper. Both these matters, however, are in a fair way to being cleared up at once. The City Commission has appointed Commissioners Otto H. Lang and A. C. Cason to make a survey of the terminal building and fix its valuation. Under the proposed franchise the terminal building is to be taken over and operated by the Strickland-Hobson interests, but entry to the terminal is not to be denied any other interurban that may build into Dallas.

The terms of the lease by which the Strickland-Hobson interests will take over the Oak Cliff lines from the Northern Texas Traction Company have not been made public and will not be made known until the form of the lease has been examined by the legal department of the city and approved. The lease gives to the Strickland-Hobson interests control over all street car lines in Oak Cliff, both within and without the city limits. The Dallas-Fort Worth Interurban is not leased, but remains under the operation and control of the Northern Texas Traction Company. The Strickland-Hobson interests, however, will control the ingress and egress of the cars on this line to and from the city of Dallas.

The city legal department is drafting franchises covering the new features of the traction and lighting situation as disclosed in the agreement recently reached between Mayor Lindsley and representatives of the Strickland-Hobson interests and Stone & Webster in the conferences at New York and Boston and explained in the statement given to the public by Mayor Lindsley on his return. Several material changes in the franchises, as adopted in the city election last April, will be made. The cumulative interest feature will be removed. Under the former franchise a rate of 8 per cent on the investment was proposed for the lighting system and 7 per cent for the railways, and if in any one year either property failed to earn this maximum rate then an added return would be allowed in succeeding years at the rate of 1 per cent a year until the deficit was overcome. Under the new franchises if a property fails to earn the stipulated rate of 7 per cent in any one year it may all be made up in the next succeeding year, provided the gross earnings are large enough. The straw vote on the valuation proposition will be taken during the week beginning Nov. 6.

REVIEW OF SPRINGFIELD STRIKE INJUNCTION

Men Reject Arbitration After It Is Advised by the Court as a Means of Disclosing Reasons for Discharge of Accused Employee

The case of the Springfield (Mo.) Traction Company against its employees to prevent them from going on strike was reviewed briefly in the ELECTRIC RAILWAY JOURNAL of Oct. 28, page 946. The developments in connection with the matter are interesting. The company originally obtained from Judge Van Valkenburgh on Sept. 27 a writ of restraint to prevent the union employees from carrying out their threat of going on strike in retaliation for what they claimed was an unjust discharge of a conductor. The company's contract with the union stipulated that the company had the right to discharge any employee for the violation of its rules and regulations. The man in question had been accused and admitted his guilt. The grievance committee also admitted that the man violated the rules. As both the discharged employee and the grievance committee admitted the violation of the rules the company refused to arbitrate. The union then threatened to call a strike. In consequence the company endeavored to prevent this by enjoining the men from striking. The original writ of restraint was heard before Judge Woodrough at Omaha, Neb. His opinion was to the effect that the guilt or innocence of the discharged conductor should be arbitrated, not because it was not an acknowledged fact, but so as to disclose to the remaining members of the union why the man was discharged.

Immediately after this decision, the company offered to arbitrate. The attorney for the union is understood to have advised the men to arbitrate, but they did not follow his advice, due, it is generally believed, to the fact that Judge Woodrough stated if there was any evidence of fraud in the conduct of the arbitration committee his court was open to either party. Moreover, the discharged employee had acknowledged his guilt and the arbitration board under Judge Woodrough's decision could only determine his guilt or innocence. The purpose of the union was in short to secure the reinstatement of the discharged employee without respect to the merits of the case. Joseph C. Colgan, of the general executive board of the Amalgamated Association, called on the management of the company shortly after its offer to arbitrate and demanded the immediate reinstatement of the discharged employee. This meant that the men expected that the company would pay the discharged employee for the entire time lost since the date of his discharge. The management of the company endeavored to go into the merits of the case with Mr. Colgan, but he is said to have made the statement that he was not present to discuss the merits of the case and left the conference after the management had refused to reinstate the discharged employee without arbitration.

The next day sixty-two of the ninety-four union employees of the company struck, the remaining thirty-two casting their lot with the company. The first cars were operated at 1 p. m. the day on which the strike was declared. The company has continued adding cars since that date, and on Oct. 24 was operating from 6 a. m. until 10 p. m. and had men to furnish 75 per cent of the regular service.

On Oct. 10, Judge Pollock of the Federal Court granted a writ of restraint preventing interference on the part of the strikers or their sympathizers with the operation of the cars of the company. This temporary writ of restraint was returnable in ten days in accordance with the Clayton Amendment to the Sherman Anti-Trust Law, and this hearing was held before Judge Van Valkenburgh of the Federal Court at Kansas City, Mo., on Oct. 20. The company's side of the case was presented by T. J. Delaney, counsel, and was supported by affidavits from seventy-five citizens of Springfield, among them lawyers, bankers, doctors, dentists, school teachers and clerks. On Oct. 23, Judge Van Valkenburgh granted a temporary writ of injunction as prayed for. This action on the part of the court has met with general approval, except from the labor element. The Judge said in his decision that it was evident that some of the members of the Police Department were in sympathy with the striking employees of the company, but that the disciplining of these men was a matter for the city authorities.

AMALGAMATED SEEKS CONTRACT IN INDIANAPOLIS

Although 80 Per Cent of Employees Have Signed New Individual Contracts Amalgamated Advances Contract of Its Own

A committee representing those employees of the Indianapolis Traction & Terminal Company who are members of the Amalgamated Association has presented to Robert I. Todd, president of the company, a form of contract which it is seeking to enter into with the company, as the award contract of the Public Service Commission under which the men have been working since the settlement of the strike in 1913 expires on Nov. 7. The majority of the car service men have already accepted the new wage scale offered by the company last June and reported in the ELECTRIC RAILWAY JOURNAL for July 15, page 114, which provided a scale of 22 cents to 30 cents an hour, an increase of approximately 8 per cent, and a continuation of the working conditions provided by the company's form of individual contract. These rates of pay become effective on Jan. 1, 1917, but all men signing the new wage agreement before that time received a bonus equal to the difference between their present rate of wages and the new scale from the date of signing the agreement to Jan. 1, 1917. About 80 per cent of the car service men have signed the new individual working contracts.

The tentative contract presented by the organized employees asks for a closed shop agreement with the Amalgamated Association, a wage scale for trainmen of 30 cents an hour the first year and 35 cents thereafter. The contract is proposed for a period to April 30, 1918, and may be renewed from year to year thereafter. It asks for the usual "three-men" board of arbitration; provides for a nine-hour day, the establishment of all regular runs as "straight earlies" and "straight lates," with twenty minutes for meal time with pay; a layover of three minutes at the end of each trip on all lines; tripper runs making less than five hours to be paid five hours' time, and runs of more than five and less than eight to be paid eight hours' time; extra men to be paid from reporting time until relieved; ten minutes to be given for reporting time; time for checking in and making out accident reports; allowance for running time from relief points to barns; carhouse seniority rights and runs opened for choice every four months; privilege of posting all association notices and collecting dues at carhouses.

The committee presenting the proposed agreement, which also covers large wage increases for shop men and power-station employees, acknowledged that it represented only a portion of the employees of the company, but refused to state its method of procedure in arriving at the basis for wage increases which it asked, or how many employees had been consulted or were represented by it. Mr. Todd advised the committee that he would take the matter under consideration and appoint a time for another meeting to discuss the demands which have been presented by the organization.

The form of individual contract in force in Indianapolis was discussed in an article in the ELECTRIC RAILWAY JOURNAL of Sept. 30, page 679, in which the form of working agreement was published in full.

ST. LOUIS COMPANY ASKING FOR A CONFERENCE

H. S. Priest, general counsel for the United Railways, St. Louis, Mo., has asked the city for a conference between committees representing the city and the company to take up the question of adjustment of the mill tax and of the duration of franchises under which the company operates. By judgment affirmed by the United States Supreme Court the company has been compelled to pay the back mill tax and there yet remains about $1,500,000 unadjudicated. Mr. Priest stated that unless adjustment of these differences is made the United Railways will be forced into receivership. In urging the conference he stated that with bonds of underlying companies maturing, lack of surplus earnings would prevent their being paid out of income and thus they could be provided for only by an issue of new bonds which under present conditions surrounding the company cannot be made to investors at any fair price to the company.

PORTLAND APPOINTS COMMITTEE TO INVESTIGATE TRACTION COMPANY

The appointment of a special committee to investigate the plight of the Portland Railway, Light & Power Company, with reference to jitney competition, was announced on Oct. 18, by E. L. Thompson, chairman of the members' council of the Chamber of Commerce of Portland, Ore. This committee was authorized at a luncheon called by the members' council, following the speech made by C. M. Clark, chairman of the executive committee of the company, reported on page 944, of the ELECTRIC RAILWAY JOURNAL for Oct. 28.

Other evidences that the statements made by Mr. Clark have set the city to thinking is furnished by the editorial comment in the daily newspapers. The Portland *Oregonian* said in part:

"It ought not to be necessary to say one word in support of the representations of C. M. Clark, of the Portland Railway, Light & Power Company. They reflect the most elementary justice imaginable. The enterprise which he represents has made its investments in Portland on a contractual basis. It has agreed in return for certain privileges to provide certain service for the public, to pay certain taxes, to do certain paving, to submit to certain other exactions upon its revenues.

"The failure of Portland to regulate the jitneys—to tax them on the same basis as the street railway is taxed, to require them to bear a portion of paving costs as does the street railway, to collect from them a bridge toll, to compel them to give transfers, to give service where service is needed, to insist that they be bonded for protection of their patrons—this failure has been termed an exhibition of bad faith, as one of unfairness toward invested capital. It is worse. It is downright dishonesty."

The Portland *Telegram* said in part:

"C. M. Clark, chairman of the board of directors of the Portland Railway, Light & Power Company, puts the case of the jitney versus the trolley squarely before the public. There is no good reason to doubt the seriousness of the situation as Mr. Clark presents it. The conditions are not those which insure the square deal, and for that reason they should be amended. It is not right, and it does not appeal to the public sense of justice that we should play favorites in this matter of the public service. If the jitney is to serve we should make it serve as reliably as the street car. Within reasonable consideration of all the conditions involved we should insist upon a jitney service that is definite, reliable, and backed by adequate and tangible responsibility. Those are the elements of free and fair competition as between the jitney and the trolley."

DECISION IN TORONTO DEVIATION CASE

The Imperial Privy Council, sitting at London, England, has allowed the appeal of the Toronto & York Radial Railway in connection with the proposed deviation of a portion of the railway track on Yonge Street, Toronto.

Some three years ago the Toronto & York Radial Railway applied to the Ontario Railway & Municipal Board at Toronto for permission to deviate its railway from Yonge Street at Farnham Avenue, on to private right-of-way west of Yonge Street. The application was opposed by the city of Toronto, which has since obtained control of the franchise on Yonge Street, and running south from Farnham Avenue. The matter subsequently reached the High Courts of Ontario, which decided in favor of the contention of the city corporation. The company then appealed to the Imperial Privy Council, which has allowed the appeal in favor of the company.

The judgment of the Privy Council, delivered on Oct. 23, finds that the company, for the purpose of operating its line, has the franchise which it claimed in respect to Yonge Street and adjoining the lands proposed to be used. On the second point, concerning the matter of obtaining the consent of the City Council of Toronto before the Ontario Railway Board could approve the plans, the judgment says it is clear that before construction is commenced the plans setting forth the proposed location of the tracks must be approved by the committee appointed by the Council, and the location cannot subsequently be altered without the consent of the committee.

INDETERMINATE FRANCHISE VOTES

Mayor Samuel C. Irving and Commissioners Robson, Gompertz, Harms and Hoff have provided for the submission to the electors of Berkeley, Cal., of resettlement franchise amendments to the Berkeley Charter, identical in substance with those proposed to the citizens of Oakland through initiative petition.

The Board of Supervisors of the county has made provision for the placing of these amendments, both of Oakland and Berkeley, on the November ballot. Thus an expression of public opinion upon these important transportation matters will be secured at the election to be held on Nov. 7.

It is anticipated that the Boards of Freeholders who are now considering new charters for Alameda and Richmond will insert in their new organic laws provisions covering the same subject.

The railway company, under the short-term franchises which it now holds on some of the principal portions of its lines has found it impossible to procure the needed money with which to meet the demands of improved service, and more particularly of extension and street reconstruction, which are constantly presenting themselves in the growing and prosperous communities through which it operates. It is confidently believed, however, that means will be available, and that people will lend their money through the purchase of railway securities, when the proposed resettlement franchise plan has been carried out.

Under the new grants the railways will have the privilege of operating the road until such time as the community desires to purchase it; the right to purchase being reserved, and to be exercised by the communities granting the resettlement franchise only with the approval of the electors.

CINCINNATI LOOP QUESTIONS CONSIDERED

In a conference with the Rapid Transit Commission of Cincinnati, Ohio, on Oct. 25, Walter A. Draper, vice-president of the Cincinnati Traction Company, told the members that 13 per cent of the gross earnings of the company were now being paid in taxes. Mr. Draper intimated that at some time in the future the city will have to waive at least a portion of the 6 per cent on the gross earnings which it is now receiving as a franchise tax, or devise some other means of lifting the burden from the company, especially if it assumes the responsibility of the rapid transit loop.

The meeting was called to discuss plans by which the company may lease and operate the loop in connection with its own lines. Mr. Draper repeated a former statement to the effect that the company regards the leasing of the loop as an untried venture, the entire risk of which it is unwilling to assume. With the increasing cost of labor and materials, the lease may become an added burden and expense.

J. P. Orr, chairman of the transportation committee of the Business Men's Club, told the commission that he regarded the lease of the loop to the company as the logical plan of operation, but that the city should retain control of the operation so that no interurban road could be kept out of the city. Mr. Draper said that the traction company was now receiving revenue from all the interurban lines using its tracks and that this would perhaps cause another complication.

E. W. Edwards, chairman of the commission, is opposed to any plan that will increase the rate of fare. He said that a 5-cent fare should be the rule, with universal transfers. Councilman Michael Mullen suggested that the city establish a fund to enable it to share the losses of the company for the first few years of the operation of the loop. Mr. Draper replied that this might be worked out in the pending revision of the franchise ordinance.

W. L. Woodward, chairman of the transportation committee of the Federated Improvement Association, took the ground that the operation of the loop would tend to decrease the operating expenses of the company, since a large proportion of the passengers could be handled much more quickly and at less cost for labor. Chairman Edwards coincided with this view.

A. P. Birnbaum, contractor, began making borings on Walnut Street on Oct. 26, to determine the nature of the subsurface for the proposed loop.

NEW TOLEDO FRANCHISE DRAFT PRESENTED

An entirely new draft of the proposed street railway franchise for Toledo, Ohio, was presented to the Street Railway Commission and Henry L. Doherty by President Johnson Thurston and Judge Emery on Oct. 26. Judge Bailey appeared as counsel for Mr. Doherty. This and the succeeding day were spent in discussing the ordinance.

Mr. Doherty said that extreme care should be taken to guard the company from the payment of excessive damage claims. Such claims against the company amount to about $200,000 annually, and not more than 20 per cent of them were legitimate. Mr. Doherty said that in some cities 1 cent of every fare went to the settlement of damage claims. The amount for such claims in Toledo was probably not more than three-fourths of a cent. Mr. Doherty objected to the provision requiring the company to keep pavements between the tracks in smooth and uniform condition. This he feared would lay the company open to damage claims, as the slightest irregularity would be clear evidence of negligence, with the requirement standing as it was written.

Another clause provides that after thirty days' notice from the city of a violation of any part of the franchise, in case of failure to correct, the franchise was automatically forfeited. Mr. Doherty characterized this as too drastic. He also advised that the prohibition of steam cars from the tracks be eliminated. A steam motor for street cars was now being perfected and the time might come when it would be desirable to use such power on the cars in Toledo.

Mr. Doherty told the commission that his criticisms were not made for selfish reasons, but because he desired to see the plan mapped out be made successful. He said that if the plan went through the present management would have no part in the ownership, as it would be to the advantage of everybody to have Ohio people own the 6 per cent guaranteed stock of the company. Should any one now connected with the company have any part in the ownership or management, it would be for sentimental and not business reasons.

At the conference held on Oct. 30 Mr. Doherty objected to the clause providing that the city may lease the line by agreeing to purchase, and paying a rental amounting to 6 per cent on the par value of the stock and an additional 2 per cent to go toward the purchase price. Mr. Doherty said that there should be a cash payment. President Thurston suggested 15 per cent, but Mr. Doherty thought it should be 25 per cent. Member N. D. Cochran was inclined to agree with Mr. Doherty, as was Nat C. Wright. The matter was left open.

Mr. Doherty objected to a maximum 5-cent fare on the ground that extensions beyond the city limits might make a higher fare desirable there. He also suggested that the city might want to adopt the zone system at some time, as the tendency seemed to be toward the idea of making the charge in proportion to the distance. He also thought that a higher charge would probably be made for "owl" cars. They have never paid at the regular rate of fare.

On the following day the discussion related to interurban lines which use the local tracks. Representatives of the interurban roads present were D. D. Schenck, president of the Toledo & Indiana Railroad; Edward E. Burrill, general manager of the Northwestern Ohio, and F. W. Coen, general manager of the Lake Shore Electric Railway. Nothing definite was decided, but the interurban men expressed satisfaction in a measure with the arrangements now in effect with the Toledo Railways & Light Company. They now pay the company 3 cents for each passenger brought into Toledo.

Another Increase in Taxes in Ohio.—The Tax Commission of Ohio announced on Oct. 20 that the valuation of street and interurban railway properties in the State had been increased $5,445,360 over the figures used last year.

Increase for Southern Public Utilities Men.—Z. V. Taylor, president of the Southern Public Utilities Company, Charlotte, N. C., has announced an increase of 1 cent an hour in the rate of pay for all conductors and motormen in the service.

Special Election on Utility Purchase.—An ordinance has been passed at Hoquiam, Wash., providing for a special election to be held at the time of the November general election on the project to bond the city for $175,000 for purchasing or condemning the power distributing plant of the Grays Harbor Railway & Light Company or to construct a municipal system. As the measure carried an emergency clause it went into effect as soon as it passed, instead of being laid on the table subject to the referendum vote of the people for a period of thirty days.

Home Rule Measure for Washington.—An initiative measure which proposes to give incorporated municipalities the right to grant and revoke franchises and regulate vehicles within the city limits was filed recently in the office of Secretary of State I. M. Howell by W. J. Dowling of Seattle. In effect, the measure would make the State jitney bond law inoperative and place the power of regulation of the jitneys, as well as street railway systems, in the hands of the cities. The bill will go before the State Legislature at its next session. It is known as initiative measure No. 27.

Chicago Terminal Plans Do Not Include Electrification.—The proposals for the new Illinois Central terminal, which were expected to be presented in ordinance form to the Council committee on terminals on Nov. 1, do not include plans for electrifying any part of the service. Alderman Geiger, chairman of the committee, has declared that unless electrification is included he will not present the measure to the committee for consideration. He is quoted as saying: "The members of the committee favor electrification, and to submit a measure with that element eliminated would be a waste of their time."

Buffalo & Wellsville Road Abandoned.—After ten months of unsuccessful operation, the Buffalo & Wellsville Railroad, formerly the Buffalo & Susquehanna Railway, plans to discontinue its freight and passenger service. Rolling stock, rails and other equipment will be scrapped and the right-of-way sold. In the ten months the line has been operated under the new ownership, C. A. Finnegan, president, Buffalo, says it has lost $45,000. The line connects Buffalo and Wellsville by way of Blasdell, Springville and Arcade. For some time before it was sold the road was operated at a loss by receivers and there was some talk of electrifying the line in an effort to make it pay.

Extension of Three-Cent Fare Privilege.—Robert S. Sloan, president of the Manhattan & Queens Traction Corporation, Long Island City, N. Y., has advised the Chamber of Commerce of the Borough of Queens that its request to have the 3-cent service of the company extended across Diagonal Street viaduct, Long Island City, has been presented to his board of directors, who have taken favorable action thereon. The corporation has announced that immediate application will be made to the Public Service Commission for the necessary permission for the change of fare, and that it will begin service as soon as such permission is obtained and the required physical changes are made.

Why Brooklyn Transit Employees Are Loyal.—The magazine supplement of the New York *Times* for Oct. 15 contained a long illustrated article, "Why Brooklyn's Transit Employees Are Loyal," giving the reasons why the strike missionaries had no success in Brooklyn. Among other things the article reviewed the welfare work in the interest of the men, referred to from time to time in the ELECTRIC RAILWAY JOURNAL as the activities of the company in this respect have been broadened. The article was graced with portraits of William Siebert, superintendent of surface lines, and John J. Dempsey, superintendent of elevated lines, both of whom are mentioned as being in very close personal touch with the employees and with the public.

Conference on Railway Problems in Spokane Proposed.—Members of the City Council of Spokane, Wash., and officials of the Washington Water Power Company and the Spokane Traction Company will confer soon for the purpose of considering ways of eliminating the parallel railway lines in the city. It has been stated that the companies are losing $1,000 daily at the present time, owing to the duplication of lines. It is also stated that 17 per cent of the mileage covered by the systems is practically in duplicate. At the conference the City Commissioners plan to ask for universal transfers, and a physical connection of the competing systems. It is understood that the railways are ready to consider proposals for affiliation, but will demand stricter regulation of jitney buses and a new franchise, with stipulations with respect to street-improvement and up-keep requirements different from those contained in the present grants.

Changes in Detroit Operating Department.—A number of appointments and changes have been made in the operating department of the Detroit (Mich.) United Railway. Richard Dawson becomes superintendent of the Fourteenth and Crosstown divisions, succeeding Albert Bath, transferred to the car accountant's department. D. A. Smith, formerly assistant superintendent of the Mack, Michigan, Brush and Davison lines, succeeds Mr. Dawson as night superintendent. J. H. Hobbs and C. W. Knight, respectively carhouse foremen at Baker & Kercheval carhouses, become assistant superintendents of the Mack, Michigan, Brush and Davison lines. J. E. Spurgeon is appointed inspector of service of the same divisions. G. H. Gehling, G. H. Williams and E. T. Cain are appointed carhouse foremen at Baker, Kercheval and Woodward carhouses.

Plea for Double-Tracking in Vancouver Rejected.—George Kidd, general manager of the British Columbia Electric Railway, Vancouver, B. C., has made definite declaration to the City Council that his company does not intend to make any further expenditures for extensions or developments of the existing street railway system until such time as the city shall place the jitneys under the regulations similar to those that govern the street railway. The company, accordingly, rejected the request of the City Council that the line on Hastings Street, from Renfrew Street to Boundary Road, be double-tracked. Mr. Kidd states that the attitude adopted by the municipal authorities in refusing adequately to control the jitney in the same way as the company is controlled under acts passed by the Provincial Legislature and under agreements with the city and surrounding municipalities has prejudiced the company's credit to such an extent that it is now impossible to make further expenditure on the local railway system.

PROGRAMS OF ASSOCIATION MEETINGS

Railway Business Association

It is announced that the annual meeting of the Railway Business Association will be held at the Waldorf-Astoria Hotel, New York, on Jan. 16, 1917. The sessions will be a business meeting at 11 a. m., election of officers 1.30 p. m. and dinner at 7 p. m. promptly. The program of speakers will be announced later.

National Association of Railway Commissioners

The twenty-eighth annual convention of the National Association of Railway Commissioners will meet in the hearing room of the Interstate Commerce Commission in Washington, D. C., on Tuesday, Nov. 14, at 10 o'clock a. m. Sessions will continue up to and including Friday, Nov. 17.

According to a change adopted at the convention last year, the committees of the association are now divided as follows: executive, one; steam railroads, seven; other public utilities, four, and general, four. Outside of the committee on statistics and accounts of public utilities, which supersedes the former similar committee for electric railways, the public utility committees are all new and their reports should be of interest.

The committees most closely associated with the electric railway field are as follows:

(a) Public Utility Rates, Thomas W. D. Worthen of New Hampshire, chairman; (b) Service of Public Utility Companies, Richard Yates of Illinois, chairman; (c) Safety of Operation of Public Utility Companies, James O. Carr of New York, Second District, chairman; (d) Statistics and Accounts of Public Utility Companies, A. F. Weber, chief statistician of New York, First District, chairman; (e) General Valuation, Charles E. Elmquist of Minnesota, chairman; (f) Capitalization and Intercorporate Relations, Edwin C. Edgerton of California, chairman; (g) State and Federal Legislation, Laurence B. Finn of Kentucky, chairman.

Financial and Corporate

ANNUAL REPORTS

Kentucky Securities Corporation

The combined comparative income statement of the Kentucky Traction & Terminal Company and the Lexington Utilities Company, the operating companies owned by the Kentucky Securities Corporation, for the years ended June 30, 1915 and 1916, is as follows with inter-company charges omitted:

	1916		1915	
	Amount	Per Cent	Amount	Per Cent
Operating revenue	$850,685	100.0	$811,628	100.0
Operating expenses	438,163	51.5	432,402	53.3
Net operating revenue	$412,522	48.5	$379,226	46.7
Miscellaneous income	29,206	3.3	28,288	3.4
Gross income	$441,728	51.8	$407,514	50.1
Fixed charges, etc	245,576	28.8	237,230	29.2
Net income	$196,152	23.0	$170,284	20.9

The combined operating revenues of all the departments showed an increase of $39,057 or 4.8 per cent during the year. Operating expenses showed only a slight increase, so that the net operating revenue increased $33,296 or 8.7 per cent. Miscellaneous income gained slightly, and fixed charges rose $8,346 or 3.5 per cent, with the result that the net income for the period showed a gain of $25,868 or 15.2 per cent.

The railway gross earnings reflected the improved business conditions which prevailed during the year, and the receipts showed an increase of 5.4 per cent. The gains were the largest on the interurban lines. The number of passengers carried, including transfers, etc., were as follows: Lexington city lines, 1916, 4,389,905; 1915, 4 277,241: interurban lines, 1916, 1,482,881; 1915, 1,341,452, and other cities, 1916, 497,054; 1915, 466,017. This improvement was shown without materially increasing the number of car-hours or car-miles run. The appropriations for maintenance in the railway department were equivalent to 16.5 per cent of the gross earnings.

In the city of Lexington, where the company supplies all retail electric service, there was shown a substantial increase in the number of customers and connected load. The new-business department gave close attention to procuring new customers and to increasing both the sales and service rendered to those already on the books. Power is being supplied at wholesale, under satisfactory long-term contracts, to other lighting companies in the central Kentucky district. The results for the year showed a small gain in receipts from these sources. The ice department had a generally satisfactory year.

During the year just ended the companies spent $94,217 on additions and betterments,. Among the largest items were: poles and fixtures, $15,658; gas department, $13,548; meters and transformers, $12,225; paving, $11,906; transmission system, $10,611, and ice department, $2,962. These expenditures were in accordance with the construction program approved early in the year, and comprised the necessary additions which were required by the increased business of the system. There is now under construction an addition to the power plant building, in which are being installed two additional boilers. It will shortly be necessary to add an additional turbine to the power equipment, to take care of the increased business.

BOSTON ELEVATED HEARINGS RESUMED

Hearings in the Boston Elevated inquiry, relative to the company's financial condition, were resumed at Boston, Mass., on Oct. 27. Following the presentation of the company's brief at previous sessions, the officers of the road held themselves in readiness to meet any further inquiries by the special legislative commission sitting in the case or by others interested in the proceedings. At the annual banquet of the Boston Chamber of Commerce in the Copley-Plaza Hotel on Oct. 26, attended by nearly 700 members, Charles F. Weed, president of the chamber, in his inaugural address pointed out the importance to all citizens of Greater Boston of the financial condition of the company, stating that if the Boston Elevated Railway substantiates its claims it will be clearly in the public interest to grant such relief as will enable it to raise new capital. The chamber has undertaken to study the question, but has not yet made its report.

STATISTICS OF OPERATION IN NEW JERSEY

The Board of Public Utility Commissioners of New Jersey has just issued a report containing statistics of the operation of public utilities in the State for the year ended Dec. 31, 1914. Included in the 450 reporting utilities are twenty-nine operating and thirty-nine non-operating electric railways. The gross revenues of the various groups, the net revenues (the amount remaining after deducting operating expenses, taxes and uncollectible bills), the ratio of net to gross and the ratio of net to capitalization are shown in the following table:

Class of Utility	Gross Revenue	Net Revenue	Per Cent of Net Revenue to Gross Revenue	Per Cent of Net Revenue to Capitalization
Gas	$13,070,000	$5,380,000	41.2	5.79
Electric	11,410,000	5,400,000	47.3	6.30
Municipal electric	170,000	39,000	23.1	....
Water	4,870,000	2,480,000	51.1	6.27
Municipal water	5,120,000	2,985,000	58.3	....
Sewer	250,000	95,000	38.0	5.11
Telephone	9,000,000	2,525,000	28.1	6.81
Street railways	19,040,000	6,410,000	33.7	3.86
All utilities	$62,930,000	$25,314,000	40.2	5.2*

*Average.

On account of the interstate character of their business, the revenues of both the Hudson & Manhattan Railroad and the American Telephone & Telegraph Company have been excluded from the preceding tabulation. Moreover, for the New York Telephone Company there is included only the revenues pertaining solely to New Jersey.

The total 1914 capitalization of the utilities in the State was $422,950,000, made up of $210,060,000 of funded debt and $212,890,000 of capital stock. For electric railways the total capitalization was $165,830,000—$92,720,000 for funded debt and $73,110,000 for stock. The per cent of total dividends to the par value of all capital stock in 1914 was 5.5 for all utilities and 2.4 for electric railways. The per cent of total dividends to the par value of dividend-paying stocks was 5.9 for all companies and 2.06 for electric railways. A total of 44.09 per cent of all utilities paid dividends, but only 34 per cent of the electric railways did so. Of these companies nine paid less than 5 per cent, ten between 5 per cent and 10 per cent, and two more than 10 per cent.

The report of the commission contains organization data for all electric railways, with capitalization figures for non-operating companies and, in addition to these, income figures for the operating lines. Detailed revenue and expense figures per car-mile are also given for each operating railway, and other mileage, traffic and miscellaneous statistics as shown in the accompanying table.

Birmingham, Ensley & Bessemer Railway, Birmingham, Ala.—The Alabama Public Service Commission has authorized the substitution of the Birmingham-Tidewater Railway, the entire capital stock of which is owned by the Birmingham Railway, Light & Power Company, for J. D. Kirkpatrick as purchaser of the Birmingham, Ensley & Bessemer Railroad at the foreclosure sale. The bondholders were not in a position to refinance the road. It is understood that the property of the Birmingham, Ensley & Bessemer Railway was taken over for approximately $1,500,000, which is much less than the original cost of the system. References to the sale of the property under foreclosure and to the subsequent negotiations for turning it over to the Birmingham Railway, Light & Power Company were contained in the ELECTRIC RAILWAY JOURNAL for Jan. 15, April 1 and 8, and Sept. 9.

Brazilian Traction, Light & Power Company, Toronto, Ontario.—William A. Read & Company, New York, N. Y., are offering $7,500,000 of three-year 6 per cent gold notes of the Brazilian Traction, Light & Power Company at 99, yielding about 6⅜ per cent to the investor. The notes are the only funded debt of the company and are secured by the pledge of $15,000,000 of bonds of subsidiary companies. The new notes precede $10,000,000 of 6 per cent cumulative preferred stock and $106,289,000 of common stock which has paid dividends since issued. The collateral to secure the notes, which will be deposited in New York, includes about $5,000,000 of Rio de Janeiro Tramway, Light & Power Company general mortgage 5 per cent bonds, about $2,500,000 of Sao Paulo Tramway, Light & Power Company general mortgage 5 per cent bonds and $7,500,000 Rio de Janeiro & Sao Paulo Telephone Company first mortgage collateral trust 6 per cent bonds. The company was incorporated in Canada in 1912. The banking house announced on Nov. 2 that all the $7,500,000 of notes of the Brazilian Traction, Light & Power Company had been sold. The Read group of bankers, it is said, expects to put out other issues of South American public utility securities, but they are not yet prepared to make any announcement concerning the next flotation.

MILEAGE, TRAFFIC AND MISCELLANEOUS STATISTICS OF NEW JERSEY STREET RAILWAYS FOR 1914

	Miles of Track Owned	Capitalization Per Mile of Track	Miles of Road Operated	Operating Revenues Per Mile of Road	Revenue Car-Miles Per Mile of Road	Revenue Car-Miles Per Car-Hour	Average Fare Per Revenue Passenger (Cents)	Transportation Revenue Per Car-Mile (Cents)	Transportation Revenue Per Car-Hour (Cents)	Total Railway Revenues Per Car-Mile (Cents)	Operating Expenses Per Car-Mile (Cents)	Operating Ratio (Per Cent)
Atlantic & Suburban Railway	17.0	$49,476	16.0	$5,302	29,974	11.8	4.76	17.6	$2.07	17.7	13.2	74.7
Atlantic City & Shore Railroad	7.7	253,247	24.5	25,495	71,567	11.2	4.75	35.4	3.95	35.9	22.3	62.1
Atlantic Coast Electric Railway	36.1	77,562	20.3	21,080	65,998	9.4	5.00	24.6	2.32	31.9	18.6	58.1
Bridgeton & Millville Traction Company	37.9	26,385	36.3	3,564	16,375	9.5	4.31	21.5	2.04	21.8	16.7	76.6
Burlington County Transit Company	14.8	8,108	15.8	4,454	23,277	9.5	5.00	18.2	1.74	19.1	18.6	97.4
Cape May, Delaware Bay & Sewell's Point Railroad	13.7	21,898	15.1	1,856	12,324	...	5.00	13.6	...	15.0	16.4	108.6
Central Passenger Railway	2.8	103,571	4.0	14,416	53,781	6.0	2.17	20.0	1.19	26.8	23.0	85.9
Five Mile Beach Electric Railway	5.7	44,859	4.9	11,143	64,390	8.9	5.00	16.9	1.51	17.3	10.4	59.9
Jersey Central Traction Company	41.2	72,815	36.8	6,231	25,072	11.6	4.90	23.2	2.68	24.9	14.4	57.8
Millville Traction Company	12.5	30,640	12.5	4,106	25.858	9.1	4.85	15.2	1.38	15.9	17.5	110.1
Monmouth County Electric Company	17.7	46,610	15.0	6,148	34,136	10.1	5.00	17.4	1.76	18.0	14.9	83.1
Morris County Traction Company	66.6	67,784	50.6	6,124	25,085	10.1	5.02	24.2	2.46	24.4	16.7	68.5
New Jersey & Pennsylvania Traction Company	14.9	107,382	13.3	5,729	23,767	14.9	4.95	23.8	3.55	24.1	16.0	66.3
New Jersey Rapid Transit Company	6.0	53,333	6.0	523	7,362	12.0	5.00	7.1	0.85	7.1	11.3	159.0
Northampton-Easton & Washington Traction Company	18.0	112,431	18.0	3,288	11,846	16.6	5.00	27.2	4.51	27.8	15.7	56.5
North Jersey Rapid Transit Company	14.5	110,345	15.2	4,117	19,427	15.1	9.16	20.7	3.12	21.2	14.7	69.2
Ocean City Electric Railroad	10.0	17,500	10.0	2,555	19,547	9.2	4.98	13.0	1.20	13.1	12.3	94.0
Phillipsburg Horse Car Railroad	7.1	4,225	6.9	13,987	72,511	8.0	5.00	19.1	1.53	19.3	14.5	75.1
Point Pleasant Traction Company	3.2	125,000	3.1	2,686	12,964	6.7	5.00	20.3	1.35	20.7	15.1	72.7
Public Service Railroad	*43.7	†47,749	38.4	3,394	15,444	21.7	20.40	21.8	4.73	22.0	18.9	86.1
Public Service Railway	*832.2	†162,095	492.1	31,838	102,023	8.9	4.98	30.9	2.75	31.2	17.9	57.5
Trenton & Mercer County Traction Corporation	*74.1	†67,312	53.2	14,551	62,089	8.7	4.32	23.1	2.00	23.4	13.5	57.7

*Miles of track operated.
†Capitalization per mile of track operated, including capitalization of lessor companies.

Chicago (Ill.) Railways.—Chauncey B. Borland and Wallace Heckman have been elected to the board of directors of the Chicago Railways to succeed R. C. Chandler and Arthur B. Jones, resigned. The other directors of the company were re-elected.

Chicago, Milwaukee & St. Paul Railway, Chicago, Ill.—The annual report of the Chicago, Milwaukee & St. Paul Railway for the fiscal year ended June 30, 1916, states that during the last year the company added to its equipment twenty electric locomotives at a cost of $2,286,962. Other additions and betterments included the expenditure of $3,870,411 for power stations, transmission systems, etc. It is said also that authority has been given for the purchase or building of additional equipment, including twenty-three electric locomotives. Electrical operation of the Rocky Mountain division between Deer Lodge and Three Forks, Mont., a distance of 112.2 miles, was started in December, 1915, and between Three Forks and Harlowton, Mont., a distance of 114.2 miles, in April, 1916. Work on the Missoula division between Avery, Idaho, and Deer Lodge, Mont., is progressing at a rate which indicates the completion of the electrical construction work on this division by the end of the present calendar year. During the last year the company expended for maintenance $2,612 on power-plant buildings, $425 on power substation buildings, $144 on power transmission systems, $18,764 on power distribution systems and $1,147 on power line poles and fixtures. The repairs to other than steam locomotives cost $36,754 during the year, while the depreciation covering the same items amounted to $9,460.

Cincinnati, Dayton & Toledo Traction Company, Hamilton, Ohio.—Benton S. Oppenheimer, receiver of the Cincinnati, Dayton & Toledo Traction Company, has made application to the Common Pleas Court of Hamilton County for authority to pay the interest due on Nov. 1, 1915, on $1,350,000 of bonds of the Southern Ohio Traction Company, a subsidiary of the Cincinnati, Dayton & Toledo Traction Company. This is part of the property included in an order of sale issued by Judge Geoghegan. The interest is payable at the office of the Cleveland Trust Company, Cleveland, Ohio.

Elmira Water, Light & Railroad Company, Elmira, N. Y.—The Elmira Water, Light & Railroad Company has applied to the Public Service Commission for the Second District of New York for authority to issue $222,000 of 5 per cent fifty-year gold bonds under the first consolidated mortgage of the company.

Federal Light & Traction Company, New York, N. Y.—At a special meeting of the Federal Light & Traction Company, Anson W. Burchard, vice-president of the General Electric Company, Harrison Williams, F. L. Dame and R. E. Breed resigned from the board and Guy E. Tripp, chairman of the Westinghouse Electric & Manufacturing Company, Calvert Townley and Samuel Insull were elected directors, leaving one vacancy to be filled. Mr. Breed, one of the retiring directors, is president of the American Gas & Electric Company, with which the name of General Electric Company has been associated, while Mr. Dame is associated with Harrison Williams. Samuel Insull is president of the Commonwealth Edison Company, Chicago, Ill., and an officer of many railways and other utilities.

Mexico (Mex.) Tramways.—At meetings of the bondholders of the Mexico Tramways and its associate companies held in London in October, the resolutions referred to in the ELECTRIC RAILWAY JOURNAL of Sept. 16, page 511, concerning the conduct of the system pending the return of conditions in Mexico favorable to reorganization were approved. The report of Messrs. Phippen and Trowbridge, who visited the Mexican properties in the interest of the trustee for the bonds, was reviewed at length in the ELECTRIC RAILWAY JOURNAL for July 15, page 118.

Municipal Railway, San Francisco, Cal.—The bookkeeping bureau of the Department of Public Works has just issued a statement giving the receipts, actual disbursements, and cash transfers for the municipal lines from the beginning of operation, Dec. 28, 1912, to Aug. 31, 1916. According to this statement, the actual receipts during this period amounted to $4,851,754, while the disbursements and transfers totaled $4,669,100, thus giving excess receipts of $182,654. The gross revenues of the lines for the period were $4,830,769, while the operating expenditures (audited) amounted to $2,728,308. The statement also reports the conditions of the reserve funds, showing that the depreciation fund has $547,643 invested in bonds, a cash balance of $180,713 and a balance of $22,913 for interest on bonds owned, making a cash total of $203,626. The injury insurance fund has a cash balance of $53,250, and the investment fund a cash balance of $200,000, thus giving a total of $456,876 for cash in all the funds and $547,643 for bonds invested in the funds.

Muscatine & Iowa City Railway, Muscatine, Iowa.—The Muscatine & Iowa City Railway, which passed into the hands of John A. Bartemeier as receiver on July 1 and suspended operation on Aug. 11, has been turned over to the Chicago, Rock Island & Pacific Railway, which is now operating the line.

Republic Railway & Light Company, Youngstown, Ohio.—The Republic Railway & Light Company has drawn for redemption on Dec. 1, at par and accrued interest, payment to be made by the Fidelity Trust Company, Philadelphia, $484,000 of its three-year 5 per cent secured gold notes. Under the trust agreement, holders of these notes have the right to convert them, par for par, into the 7 per cent preferred stock of the Mahoning & Shenango Railway & Light Company, the operating subsidiary of the Republic Railway & Light.

Southern New York Power & Railway Company, Cooperstown, N. Y.—The Public Service Commission for the Second District of New York has approved the plan for refinancing the Southern New York Power & Railway Company, formerly the Otsego & Herkimer Railroad. In the readjustment control is acquired of the Colliers Light, Heat & Power Company, and through the latter corporation control of the Deposit Electric Company, the Hartwick Power Company, and Southern New York Power Company. The company has been authorized to issue $200,000 of stock and $500,000 of bonds with which to take up the securities of the smaller companies, and, in addition, is authorized to issue $1,200,000 of 5 per cent first mortgage bonds with which to refund, if it desires to do so, an equal amount of bonds now outstanding of the Otsego & Herkimer Railroad.

Tidewater Southern Railway, Stockton, Cal.—The Tidewater Southern Railway has filed with the California Railroad Commission applications for authority to extend its line from Hatch, Stanislaus County, to Irwin City, Merced County, 8 miles, and to issue securities to pay for this extension, for freight terminals in Modesto and for other improvements of its system. The company wants to issue $600,000 of its common stock now in its treasury, to net $480,000 cash. It operates a standard gage railroad between Stockton and Turlock, 50 miles, with a number of branches. The extension, equipped, will cost $109,700. The remainder of the $480,000 will be devoted to procuring freight terminals in Modesto, and additional terminals at Turlock, changing its entrance and route into Stockton, the construction of interchange tracks at Ortega, electrifying the present lines from Modesto to Turlock, installing an interlocking crossing of the Southern Pacific Company tracks south of Modesto, purchase of three additional freight motors, two passenger cars and other equipment, and the paying off $88,717 of the company's notes.

United Light & Railways Company, Grand Rapids, Mich.—Announcement has been made of the sale by United Light & Railways Company to William P. Bonbright & Company, Inc., New York, N. Y., of $1,000,000 first and refunding 5 per cent bonds and $1,500,000 of 6 per cent ten-year debentures. The price at which the securities will be sold has not yet been made public. They are to be offered about Nov. 10. The proceeds of the sale will be used to retire $750,000 of short-time notes now outstanding and to provide funds for liquidation of all floating debt of the company and will give in addition substantially $1,000,000 for additions and extensions to operated properties.

United Railways, St. Louis, Mo.—Kentucky stockholders of the United Railways have been asked to send proxies to a committee composed of John W. Barr, J. A. Cheek and George W. Norton in an effort to obtain concerted action among the stockholders.

DIVIDENDS DECLARED

Connecticut Railway & Lighting Company, Bridgeport, Conn., quarterly, 1 per cent, preferred; quarterly, 1 per cent, common.

Grand Rapids (Mich.) Railway, quarterly, 1¼ per cent, preferred.

Illinois Traction Company, Peoria, Ill., quarterly, three-quarters of 1 per cent, common.

Massachusetts Consolidated Railways, Greenfield, Mass., quarterly, 1⅜ per cent, preferred.

Monongahela Valley Traction Company, Fairmont, W. Va., quarterly, 1¼ per cent, preferred.

Union Street Railway, New Bedford, Mass., quarterly, 2 per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

Period		Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, ME.						
1m., Sept.,	'16	$74,833	*$38,244	$36,589	$18,164	$18,425
1 " "	'15	71,400	*35,960	35,440	17,450	17,990
12 " "	'16	810,403	*440,681	369,722	212,565	157,157
12 " "	'15	783,707	*387,671	396,036	211,970	184,066
CAPE BRETON ELECTRIC COMPANY, LTD., SYDNEY, N. S.						
1m., Aug.,	'16	$35,264	*$19,185	$16,079	$6,568	$9,511
1 " "	'15	33,225	*18,160	15,066	6,603	8,463
12 " "	'16	385,278	*225,932	159,346	78,532	80,814
12 " "	'15	338,506	*206,903	131,603	78,999	52,604
CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN.						
1m., Sept.,	'16	$105,056	*$72,995	$32,061	$29,528	$2,533
1 " "	'15	94,588	*61,079	33,509	30,121	3,388
12 " "	'16	1,214,613	*766,421	488,192	356,152	92,040
12 " "	'15	1,047,202	*719,406	327,796	355,230	†27,434
CITIES SERVICE COMPANY, NEW YORK, N. Y.						
1m., Sept.,	'16	$722,054	$21,531	$700,523	$340	$700,183
1 " "	'15	349,456	14,302	335,154	40,833	294,321
12 " "	'16	7,522,547	226,667	7,295,880	380,510	6,915,370
12 " "	'15	4,121,621	159,571	3,962,050	490,000	3,472,050
COLUMBUS RAILWAY, POWER & LIGHT COMPANY, COLUMBUS, OHIO						
1m., Sept.,	'16	$289,975	*$177,917	$112,058	$42,862	$69,196
1 " "	'15	266,435	*154,383	112,052	40,200	71,852
12 " "	'16	3,426,016	*2,007,953	1,418,063	509,659	908,404
12 " "	'15	3,066,603	*1,819,624	1,246,979	471,860	775,119
COMMONWEALTH POWER, RAILWAY & LIGHT COMPANY, GRAND RAPIDS, MICH.						
1m., Sept.,	'16	$1,434,201	*$799,304	$634,897	$421,048	$213,849
1 " "	'15	1,211,588	*660,915	550,673	372,360	178,313
12 " "	'16	16,340,522	*8,746,988	7,593,534	4,961,774	2,631,760
12 " "	'15	14,116,576	*7,527,018	6,589,558	4,336,950	2,222,608
EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.						
1m., Sept.,	'16	$260,888	*$152,922	$107,966	$63,150	$44,816
1 " "	'15	206,405	*122,453	83,952	62,904	21,048
12 " "	'16	2,862,052	*1,701,587	1,160,465	752,969	407,496
12 " "	'15	2,424,763	*1,441,513	983,250	759,927	223,323
EL PASO (TEX.) ELECTRIC COMPANY						
1m., Aug.,	'16	$84,156	*$78,121	$6,035	$4,920	$1,115
1 " "	'15	75,111	*42,680	32,431	4,204	28,227
12 " "	'16	1,504,363	*603,227	451,136	54,883	396,253
12 " "	'15	979,877	*527,608	452,269	50,361	401,908
HUDSON & MANHATTAN RAILROAD, NEW YORK, N. Y.						
1m., Sept.,	'16	$475,988	*$218,846	$257,142	$214,390	$42,752
1 " "	'15	435,789	*185,768	250,021	211,295	38,726
3 " "	'16	1,370,638	*629,238	741,400	643,739	97,661
3 " "	'15	1,290,898	*566,812	724,086	634,533	89,553
PADUCAH TRACTION & LIGHT COMPANY, PADUCAH, KY.						
1m., Aug.,	'16	$26,157	*$17,627	$8,530	$7,163	$1,367
1 " "	'15	23,550	*14,253	9,297	7,535	1,762
12 " "	'16	307,276	*198,215	109,061	87,692	21,369
12 " "	'15	290,205	*182,704	107,501	91,837	15,664
PENSACOLA (FLA.) ELECTRIC COMPANY						
1m., Aug.,	'16	$24,398	*$13,379	$11,019	$7,712	$3,307
1 " "	'15	22,075	*12,511	9,564	7,090	2,474
12 " "	'16	278,596	*154,295	124,301	89,934	34,367
12 " "	'15	245,485	*148,256	97,229	86,849	10,380
TAMPA (FLA.) ELECTRIC COMPANY						
1m., Aug.,	'16	$74,194	*$43,219	$30,975	$4,398	$26,577
1 " "	'15	78,924	*40,365	38,559	4,352	34,207
12 " "	'16	966,144	*522,216	443,928	52,334	391,594
12 " "	'15	978,209	*502,026	476,183	52,639	423,544
TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS, MINN.						
1m., Sept.,	'16	$854,747	$504,810	$349,937	$149,828	$200,109
1 " "	'15	817,922	502,569	315,353	140,418	174,935
9 " "	'16	7,594,988	4,692,777	2,902,211	1,292,995	1,609,216
9 " "	'15	7,014,857	4,531,392	2,483,465	1,272,247	1,211,218

*Includes taxes. †Deficit.

Traffic and Transportation

1,898,735,615 CARRIED IN NEW YORK IN YEAR

Public Service Commission Reports This Total for Greater New York Lines

There was an increase of 91,000,000 passengers carried on the surface, subway and elevated lines of Greater New York for the year ended June 30, 1916, over the preceding year. This increase was bigger than that of any other year except 1906 and 1910, when the increases were 120,000,000 and 128,000,000 respectively. A pamphlet soon to be published by the Public Service Commission of the First District of New York will contain some tables, of which the most interesting will show the number of passengers carried every year by all of the city lines and the increases since 1900, and the per capita fares since 1860. The latter table is presented to prove that street railway passenger travel within the city increases at a very much more rapid rate than the population. Here are the figures:

Year Ended June 30	Number of Passengers	Annual Increase
1900	846 353,058	....
1901	881.344,801	34,991,743
1902	938,989,964	57,645,163
1903	1,000,767,483	61,777,519
1904	1,065 984,910	65,217,427
1905	1,130,982,696	64,997,786
1906	1,251,841,175	120,858.479
1907	1,315,381,388	63,540,213
1908	1,358.000,407	42,619,019
1909	1,402,417,642	44,417,235
1910	1,531,262,914	128,845.272
1911	1,603,901,397	72,638,483
1912	1,680 913,935	77,012,538
1913	1,769,876,508	88,962,573
1914	1,813,204,356	43,327,848
1915	1,807,632,726	*5,571,630
1916	1,898,735,615	91,102,889

*Decrease.

Year	Fares Per Capita	Year	Fares Per Capita
1860	43	1900	246
1870	103	1905	283
1880	152	1910	321
1890	218	1916	356

The commission says:

"The increase for the year 1915-16 serves in a measure as a thermometer of the conditions of business in New York City, inasmuch as the year 1914-15, which reflected the worst business conditions seen in the city in a great many years, showed a decrease in passenger travel of more than 5,000,000 for the year. Eliminating the decrease of 1914-15, the year 1915-16 shows a net increase over 1913-14 of about 85,000,000. The year 1914-15 is the first year to show a decrease since the consolidation of the greater city.

"Passenger traffic, by the methods mentioned, has increased in the city more than 1,000,000,000 in sixteen years. The total number of passengers carried on all the lines for the year 1915-16 was 1,898,735,615. In the year 1900 traffic was only 846,353,058. The first increase after that date in the figures of travel appears in the figures of 1905-06, when there is a sudden increase of traffic of 120,858,000 for the year, reflecting the first year of full reports from the operation of the subway."

The statement of the commission contains some analyses and explanations. For instance, during the Hudson-Fulton celebration in 1909 there was a big increase in traffic, for which the celebration received credit. Then the statement says that the new subways, with the old elevated lines operated by the New York Consolidated Railroad of Brooklyn and the first subway operated by the Interborough Rapid Transit Company, contributed almost equally to the year's increase in passenger travel. This increase, including elevated and subway lines, was 26,667,600 according to one report and 25,919,569 according to another. Then the commission's statement says:

"The Interborough's elevated division reports an increase of 10,454,279 passengers, due undoubtedly to the new third tracks which were placed in operation on Jan. 17, 1916, and which have since carried big crowds.

"The surface lines operated by the New York Railways carried 8,454,084 more cash passengers than in the year preceding. The increase on the Brooklyn Rapid Transit Company's surface lines amounted to 6,174,408, and that on the lines of the Third Avenue Railway, including the Bronx and North River line, but excluding the Yonkers line, amounted to 6,587,738. The Second Avenue line in Manhattan was one of the few railroads to show a decrease, reporting for the year 186,157 fewer fares than in the year previous.

"The Hudson & Manhattan Railroad reported an increase of 4,327,120 passengers, and there was an increase of 1,481,295 on the lines of the New York & Queens County Railway, operating in the Borough of Queens, excepting lines of the Brooklyn Rapid Transit Company."

The following table shows the increases by boroughs in street surface railway travel as distinguished from passenger travel on the elevated and in the subway lines:

	Revenue Passengers, 1916	Increase Over 1915
Borough of Manhattan	427,373,847	11,822,731
Borough of the Bronx	84,535 737	3,032,934
Borough of Brooklyn	363,568,755	8,868,642
Borough of Queens (excluding B. R. T.)	54,167,403	1,481,295
Borough of Richmond	14,884,534	572,525
Total	944,530,276	25,778,127

I. T. S. ST. LOUIS FARE CASE ARGUED

Interstate Commerce Commission Hears Argument in Case Involving Fare Increase from 5 Cents to 10 Cents

The Interstate Commerce Commission resumed work on Oct. 4 after the summer vacation. Among the first matters heard was the argument in the Illinois Traction System fare case at St. Louis, referred to previously in the ELECTRIC RAILWAY JOURNAL of April 29, page 840, in which is involved the right of the company to increase its passenger fares between St. Louis, Mo., and Granite City. Madison and Venice. Ill., from 5 cents to 10 cents. Henry I. Green, attorney for the company, appeared for it, and Charles H. Daus, city counsel, and C. E. Smith, civil engineer, appeared for the city.

The company operates in St. Louis under an ordinance granted by the city of St. Louis, which limits the fare to be charged between St. Louis and Granite City, or to intermediate points, to 5 cents a trip. The haul is 7½ miles and includes passage over the McKinley Bridge. The investment in the bridge and railway properties amounts to about $6 000,000.

The city takes the position that the ordinance constitutes a contract, binding upon the Interstate Commerce Commission, and that the fare cannot be increased except by agreement with the city. The city also claims on one hand that the company has no right to do a freight business in St. Louis, and on the other hand urges that the company increase its freight business so as to make up for the deficit in the passenger business.

Mr. Green argued before the Interstate Commerce Commission that there was abundant precedent in the previous action of the commission in other cases, and also in the decisions of the United States Supreme Court, to the effect that any attempt to fix interstate fares by an ordinance passed by the City Council was invalid as against an order of the Interstate Commerce Commission fixing the reasonable tariffs and charges.

Mr. Green in his brief last May explained that by the new tariffs filed no change is made in the fare between any point in St. Louis and the east end of the McKinley Bridge in Illinois, which is designated as the Main Street station in Venice. The new tariffs, suspended by order of the commission until December, provide for a cash fare of 5 cents between any point in St. Louis and the Main Street station in Venice and an additional 5-cent fare to any point east of the Main Street station in Venice. Mr. Green urged that the important inquiry in the case was whether or not necessity existed for the increase in passenger fares sought by the tariffs under investigation. He said that it was proved conclusively that the St. Louis Electric Terminal Railway had failed each year since the operation of its line to earn sufficient to meet its fixed charges, and that the amount of the deficit at present was more than $1 000,000, or approximately a net loss in operation of $200 000 annually. It was to remedy in part this growing deficit that the company sought approval of the new tariff.

In presenting and discussing the evidence in the case Mr. Green took up in turn the questions of the character and the value and investment of the properties, the earnings, the competitive traffic conditions and the anticipated results from the proposed increase in fares. He said that the decision in the case rested primarily upon the questions whether the Interstate Commerce Commission has jurisdiction to hear and determine the case, whether the city has the power to preclude by ordinance the determination of the case by its attempt to fix rates for interstate commerce in and out of St. Louis, and whether the proposed increases as stated in the tariffs under suspension were justified under the existing facts and conditions. Mr. Green contended that the Steubenville Tri-State Railway case, the Covington & Cincinnati bridge case, the South Covington & Cincinnati Street Railway case, the Washington-Virginia case and the New York-Jersey City ferry case established conclusively that the commission had jurisdiction in the present proceeding, which involved interstate fares over an interstate bridge. With respect to the power of the city of St. Louis to fix rates he said that the provisions of the ordinance of the city in attempting to limit the fare were illegal and void and not binding upon the commission. With respect to the proposed increase in passenger fares in St. Louis and Granite City he said that there was abundant evidence to justify them.

Mr. Daus, for St. Louis, challenged the jurisdiction of the commission on the authority of the Omaha-Council Bluffs Street Railroad case. Mr. Green in his reply briefly characterized this as ingenious and peculiar. He said that the language of the Supreme Court in the Omaha case was clearly in support of the jurisdiction of the commission in the present case. The quotation from the Omaha case in the brief of the protestant, Mr. Green said, was directly antagonistic in its effect to the conclusion stated by counsel for the city, predicated thereon.

HEARING ON BOSTON FREIGHT SERVICE PLANS

The Public Service Commission of Massachusetts held a hearing on Oct. 16 upon plans of the Boston Elevated Railway for handling bulk freight on its system both locally and in conjunction with the Bay State Street Railway and the Boston & Worcester Street Railway. H. B. Potter, assistant to the president, outlined the company's plans. These, in the main, include the operation of freight service on an off-peak basis, carload hauls being the basis of the work. Mr. Potter said that the company preferred to do a bulk freight business to handling pick-up and delivery business and that it desired to utilize the existing investment in rolling stock and tracks to the utmost so as to keep down the overhead charges and avoid interference with its existing passenger traffic. Thus, it is intended to utilize motor-driven snow plows as locomotives in winter and motor-driven dump cars in summer. The elevated company does not wish to invest in additional locomotive units for this business under present conditions.

Both the Boston Elevated Railway and the Bay State Street Railway are asking the commission for authority to operate freight trailers. One of the problems discussed was the projected handling of Boston garbage and ashes by the former company. Conferences have been held with the Boston Sanitary Disposal Company relative to the transportation of ashes and garbage in special trailer cars from collecting bins in various parts of the city to the wharf or sorting station. It is estimated that with this system in operation about $20 000 a year could be saved the city of Boston, and the streets would be relieved of many of the garbage and ash teams now hauled through the highways. Mr. Potter also suggested that the company could effect economies in the handling of crushed stone and rock for the city.

In the near future the Boston Elevated Railway will begin to haul molasses cars between Copps Hill Wharf and the plant of the Purity Distilling Company in East Cambridge, about two miles, by surface line route. Six cars will accomplish the work of about thirty-five teams. The molasses will be loaded from a 2,500,000-gal. tank on the waterfront and the road will haul tank cars owned by the Distilling company, using its own motive power. Plans are also under consideration for hauling fish in carload lots from the Commonwealth Fish Pier in South Boston to interior points in eastern Massachusetts.

ALBANY FARE INCREASE ALLOWED

The Public Service Commission for the Second District of New York has rendered a decision favorable to the company in connection with the application of the United Traction Company, Albany, for permission to increase its fares between Albany and Troy from 10 cents to 15 cents. Arguments before the commission were closed on May 17. The proposed tariff, effective on Nov. 25, operates to increase the cost to each passenger 5 cents for travel as follows: Between points in the local zone (a) Albany-Rensselaer, or (b) Troy-Watervliet-Cohoes-Waterford-Green Island not reached by the through zone car lines and points in the town of Colonie between Albany (north city line) and Watervliet (south city line); between points in local zone Albany-Rensselaer not reached by the through zone car lines and the termini of through zone car lines in Troy or Cohoes; between points in local zone Troy-Watervliet-Cohoes-Waterford-Green Island not reached by the through zone car lines and the terminal of through zone car lines in Albany; between points in local zone Albany-Rensselaer not reached by the through zone car lines and points in local zone Troy-Watervliet-Cohoes-Waterford-Green Island not reached by the through zone car lines.

The new tariff proposes to divide the territory served by the company into two local zones and one through zone. The local zones are (a) Albany-Rensselaer, which covers territory reached by local car lines operating wholly within the corporate limits of the cities of Albany or Rensselaer, and also through car lines operating from and to points in Albany to and from points in Rensselaer, and (b) Troy-Watervliet-Cohoes-Waterford-Green Island, which covers territory reached by the local car lines operating wholly within the corporate limits of the cities of Troy, Watervliet and Cohoes and the villages of Waterford and Green Island, and through car lines operating wholly within this zone. The through zone terminal points are the Plaza in Albany, Broadway and Third Streets in Troy, and Mohawk and Remsen Streets in Cohoes, the territory covered being that reached by through car lines operating wholly between such terminals.

Points in the town of Colonie between Albany (north city line) and Watervliet (south city line) are taken from the present Albany and Troy local zones and placed in the proposed through zone. The through zone car lines are not to carry local passengers between points in the cities of Albany, Troy or Cohoes, and no transfers will be given to passengers traveling from points in the through zone to points in either of the local zones, or vice versa.

Endless Chain Revived in Kansas City.—A company operating an endless chain coupon selling plan, involving the distribution of street car tickets, has started in Kansas City, and is under investigation. The plan is worked along the old line. The company sells a book of coupons for $1. The purchaser sells the three coupons it contains for 25 cents each, thus getting back 75 cents of his investment. When each of the three on any one coupon book has purchased a book, the original holder may exchange his coupon book cover for twenty-five tickets worth $1.25.

Shop Early Campaign in Washington.—For the purpose of starting a "shop early for Christmas" campaign, the Washington Railway & Electric Company, Washington, D. C., has placed its new private parlor car "Columbia" at the disposal of the board of governors of the Retail Merchants' Association for trips to nearby points on the company's lines and those of the Washington-Virginia Railway. The first trip, a journey to Alexandria, Va., is planned for Nov. 13.

Railway Man Appointed to Traffic Committee.—Thomas Penney, vice-president and general counsel of the International Railway, Buffalo, N. Y., has been appointed a member of the special committee named by Mayor Louis P. Fuhrmann to study traffic conditions in the congested business centers with a view of establishing safety zones, and enacting new traffic ordinances. Others on the committee represent taxi-cab companies, trucking associations and the automobile club. The Mayor has returned from a tour of cities in the middle west, where he made a study of safety zones and traffic ordinances.

Company Must Publish Transfer Regulations.—Although rules and regulations governing the use of transfers have been printed by the International Railway, Buffalo, N. Y., on the reverse side of its transfers for many years, Justice Wheeler in the Supreme Court of Erie County, has reversed the decision of a city court judge and holds that the company must publish its transfer rules and regulations before enforcing them. The case is that of an action brought against the company by a passenger who was ejected from a car while trying to make a round trip on a transfer. The company's regulation printed on the reverse side of all transfers says passengers must take the most direct route to their destination, while the passenger who brought the action against the company was taking a long indirect route which would bring him back to the starting point. The city court dismissed the action, but an appeal was taken to the Supreme Court and the decision of the lower court is reversed and the company is ordered to publish its transfer regulations. The company will probably take an appeal from this decision.

Springfield Passes Strict Jitney Ordinance.—After extended deliberation and much public discussion, the City Council of Springfield, Mass., on Oct. 23 passed an ordinance regulating jitney traffic. The ordinance took effect on Nov. 1. In addition to strict requirements as to the routing of jitneys, age of operators, obtaining of certificates from the city, etc., it contains a provision that every motor vehicle so licensed shall be operated for six or more hours a day in every day during the term of its license; that no such vehicle shall be operated by any person more than twelve hours a day; and that no solicitation of passengers by outcry or noise shall be permitted. No motor-vehicle in the jitney class is allowed to take on passengers on any street within 35 ft. of any white post or other designated street railway stopping place; no passenger with a child in arms or seated on the lap is permitted to ride on any front seat of the vehicle, and no person is permitted to stand upon any running board, fender or step, or to sit upon any fender, dash, top or door. No passenger can be charged more than 5 cents for being carried in a motor vehicle so licensed between any two points in the city within the circle having a radius of 2.5 miles from Court Square. A $1,000 bond is required and strict police supervision of routes and standing places is specified. License fees are $15 for every motor vehicle licensed to carry seven passengers or less and $5 additional for passengers authorized in excess of seven.

Model Jitney Ordinance for Portland Explained.—Commissioner Dieck of Portland, Ore., is working on a model jitney franchise ordinance along the lines adopted by a majority of the Council recently. This measure will provide that jitneys shall not operate along street railway lines, except where absolutely necessary to reach the congested districts, but shall operate over streets to districts not now served by other transportation facilities; that jitney franchise-holders shall be required to file substantial bonds to indemnify the city or the public against damage and as a guaranty of the faithful performance of the terms of the grant; that they shall be required to make payments commensurate with those now being made by the Portland Railway, Light & Power Company to the city for the privilege of operating. Commissioner Daly, alone of the five members of the Council, held out for more liberal handling of the problem from the jitney standpoint. Undismayed by the decision of the Council to place jitneys under adequate franchise restrictions, L. B. Jones, et al, has filed a petition with the Council for a franchise to operate a line of jitneys between Portland and Linnton. The petitioners ask for a franchise for five years, and agree to operate cars every fifteen minutes from 6 a. m. until midnight, and give bond of $500 as a guarantee of the faithful performance. They request the right to charge a 10-cent fare. "Jitney Regulation" was the principal topic discussed at a recent meeting of the Oregon Civic League. F. I. Fuller of the Portland Railway, Light & Power Company, presented the side of the street railway. Arthur I. Moulton, attorney for Chauffeurs' Union, presented the side of the jitney drivers. Commissioners Dieck and Daly of the Portland City Council, explained the view that the Council now takes of the matter.

Personal Mention

George Bullock has resigned as president of the United Gas & Electric Corporation, New York, N. Y., and has been elected chairman of the board of the company. Mr. Bullock is succeeded as president of the company by Edward G. Connette, as noted elsewhere in this column.

Thomas Ahearn, president of the Ottawa (Ont.) Electric Railway, motored from Ottawa to New York to see the Harkness trophy contest at Sheepshead Bay on Oct. 28. Mr. Ahearn holds the record for the fastest run between New York and Ottawa—458 miles in thirteen hours twenty minutes.

Arthur H. Sarvis has resigned from the Detroit (Mich.) United Railway and severs his connection with *Electric Railway Service*, published by that company, with which he has been connected as associate editor since the beginning of the the publication more than three years ago. Mr. Sarvis goes to Flint, Mich., as one of the executive staff of the Flint Varnish & Color Works.

Joseph O. Gauthier, superintendent of rolling stock and shops of the Middlesex & Boston Street Railway, Newtonville, Mass., was tendered a reception recently by the employees of the mechanical department, on the occasion of the completion of his twenty-fifth year in the employ of the company. The affair was planned while Mr. Gauthier was in attendance at the convention of the American Electric Railway Association in Atlantic City. On his return home from that meeting Mr. Gauthier was surprised at his son's house by the employees, headed by George M. Cox, vice-president and general manager of the company. Mr. Cox complimented Mr. Gauthier on his length of service with the company, and in behalf of the men he presented to Mr. Gauthier a Waltham watch and $25 in gold from the directors of the company. Mr. Gauthier started to work twenty-five years ago for the Newton Street Railway at the West Newton carhouse. In a short time he was made foreman, and when the Newton roads were consolidated in 1902, he took charge of repairs at the Waltham station. This station was made the central repair shop a few years ago, and Mr. Gauthier was appointed superintendent of rolling stock and shops in charge of the car repairs for the whole system.

E. G. CONNETTE

Edward G. Connette, president of the International Railway, Buffalo, N. Y., vice-president of the International Traction Company, and since January a vice-president of the United Gas & Electric Corporation, New York, N. Y., was elected president of the United Gas & Electric Corporation on Oct. 26 to succeed George Bullock, who becomes chairman of the board. Mr. Connette will remain as president of the International Railway. Mr. Connette was born in Austin, Ind., on Dec. 29, 1863. He obtained his early education in the public schools. In 1879 he secured his first employment, this being in the capacity of telegraph operator on the Louisville Division of the Pennsylvania Railroad. Later he accepted an appointment as telegraph operator at the general offices of the Louisville, Cincinnati & Lexington Railroad at Louisville, Ky. He was subsequently transferred to the office of the general superintendent of the company. Shortly afterward the Louisville, Cincinnati & Lexington Railroad was purchased by the Louisville & Nashville Railroad and Mr. Connette was transferred to the engineering department of the company. Two years later Mr. Connette was made chief clerk of the Henderson Division of the company with headquarters at Henderson, Ky. He was next appointed assistant to the superintendent of the company at Nashville, Tenn., and when the street railways in that city were consolidated in 1890, Mr. Connette accepted the position of superintendent of the consolidated company. In 1891 he was made general manager of the company and in 1897 became chief engineer of the Cumberland Electric Light & Power Company, which position he held in addition to that of general manager of the street railway company. On April 1, 1900, Mr. Connette accepted the appointment of vice-president of the Syracuse (N. Y.) Rapid Transit Company, in which position he continued until 1905, when he was appointed general manager of the Worcester (Mass.) Consolidated Street Railway. In 1909 he accepted the position of transportation engineer of the Public Service Commission, First District, New York State. Mr. Connette on May 1, 1912, was elected vice-president of the International Railway, continuing in this capacity until Jan. 1, 1913, when he was made president of the company. Besides holding the office of president, he is also a director and member of the executive committee of the International Railway. He is also vice-president, a director and member of the executive committee of the International Traction Company. The United Gas & Electric Corporation, of which Mr. Connette has been made president, is one of the largest public utility holding companies in the United States. The properties which it controls include in addition to the International Railway electric railways, gas and fuel companies and light, heat and power companies located mostly in the East, the Middle West and the South.

OBITUARY

George H. Hart, at one time superintendent of the Pawcatuck Street Railway, Westerly, R. I., died at New London, Conn., recently.

James Grady, who was connected with the Columbia Machine Works & Malleable Iron Company, Brooklyn, N. Y., for twenty-two years and was for many years vice-president and general manager of the company, died at his home in Brooklyn on Oct. 28. Mr. Grady had not been well for some time and more than a year ago disposed of his interest in the company and retired from the management. He was born in New York City on Sept. 6, 1857. He is survived by his widow and nine children.

William C. Cuntz, managing director of the Goldschmidt Thermit Company of New York, died Nov. 2 at Auburndale, Mass., in his forty-fifth year. He had not been well for several weeks and about a year ago had an operation for appendicitis. Mr. Cuntz was born and educated in Hoboken and started his business career with the Pennsylvania Steel Company of Steelton, Pa., first with the bridge and construction department. Later he entered the sales department, which he represented in Boston, Philadelphia, and London, England. He became connected with the Goldschmidt Thermit Company in 1910. Mr. Cuntz was as large of heart as he was of frame and well known in electric railway circles. He is survived by a widow and two sons. He was a member of the American Society of Civil Engineers, the American Iron & Steel Institute, the Engineers' Club of New York and many other organizations.

Charles Wilcox Hotchkiss, president and director of the Richmond Light & Railroad Company, Staten Island, New York, died on Oct. 29 at Battle Creek, Mich., from organic heart disease. He was in his fifty-fourth year. Mr. Hotchkiss was born in Unadilla Forks, N. Y. He entered railroading in 1881, when he became a rodman on the New York, West Shore & Buffalo Railroad. In 1886 he became assistant engineer of the Michigan Central Railroad and in 1895 was appointed chief engineer of the Chicago Junction Railway, where he remained until 1899, when he became president of the Indiana Harbor Railroad. Mr. Hotchkiss later became general manager of the Chicago, Indiana & Southern Railroad and of the Indiana Harbor Railroad. On May 1, 1912, he was chosen president of the Chicago Tunnel Company, which office he held at the time of his death. He was also president and a director of the Chicago Utilities Company, president and a director of the Staten Island Midland Railway, and chairman of the board of directors and of the executive committee of the Virginian Railway. In 1913 Mr. Hotchkiss was elected president of the Rail Joint Company of America and of the Staten Island properties.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Rumford Falls & Bethel Street Railway, Rumford, Me.**—This company has been granted a charter by the Legislature to construct an electric railway. It is proposed to issue $200,000 in stock and bonds, the proceeds to build and equip the line, and $50,000 to pay for organization services, surveys, right-of-way, and financing.

***Amityville-Stowe Electric Railway, Amityville, Pa.**—Chartered to operate an electric railway between Amityville and Stowe. Capital stock $50,000. Peoples Brothers, Inc., Philadelphia, are reported interested.

FRANCHISES

Peoria Heights, Ill.—The Peoria & Chillicothe Electric Railway has asked the Council for a franchise in Peoria Heights.

What Cheer, Iowa.—The Burlington Railway & Light Company has received a twenty-five year franchise from the Council to supply electricity in What Cheer. A street-lighting system, to cost about $5,000, will be installed.

Galena, Kan.—The Southwest Missouri Railroad will soon ask the Councils of Galena and Baxter Springs for franchises to construct its proposed extensions in those cities.

***Ashland, Ky.**—Dr. L. M. Hunter, Owensboro, who plans the construction of a line between Ashland and Russell, will ask the City Council of Ashland for a franchise.

Henderson, Ky.—No bids were received for the franchise recently advertised for sale in Henderson. A new franchise was drawn up some time ago which it was proposed the Henderson Traction Company should purchase to take the place of the franchise that expired on Oct. 22. The City Council has approved a suggestion that cars be permitted to continue operating without the franchise, and a meeting has been called to consider the situation.

Springfield, Mass.—The Springfield Street Railway has completed plans for the Carew Street extension and a petition for a franchise is being drawn up and will soon be submitted to the City Council.

Buffalo, N. Y.—The Frontier Electric Railway, which will operate an express service between Buffalo and Niagara Falls, has filed an aceptance of a city franchise with the City Clerk which will permit the construction of a short stretch of track in North Main Street.

Walla Walla, Wash.—The proposition of granting a franchise to the Walla Walla Valley Railway for construction and maintenance of an electric line on South Ninth Street, from Orchard Street to Main Street, will be placed before the voters of Walla Walla at the November election. The Walla Walla Valley Railway petitioned for the franchise last summer.

TRACK AND ROADWAY

***Clarksville, Ark.**—It is reported that the construction of an electric railway from Clarksville to Hagarville, Silex and other points is proposed. Address Railroad Committee, Clarksville.

Fort Smith Light & Traction Company, Fort Smith, Ark.—This company is reconstructing its tracks on Grand Avenue, laying heavier rails on a concrete base. The improvements are being made by the company prior to paving by the city.

Visalia Electric Company, Exeter, Cal.—Construction work will soon be begun on an extension of this company's line from Exeter in a general southeasterly and southerly direction to Ducor, Tulare County, a distance of approximately 33 miles.

Pacific Electric Railway, Los Angeles, Cal.—It is reported that this company will construct a double-track extension on Fourth Street between Ross and Minter Streets. The cost is estimated at $20,990.

Municipal Railways of San Francisco, San Francisco, Cal.—Bids were recently opened by the Board of Works for the construction of an extension of the Potrero Avenue car-line, the lowest bidder being Eaton & Smith, San Francisco, at $6,380.

Tidewater Southern Company, Stockton, Cal.—This company has filed with the Railroad Commission of California applications for authority to extend its line from Hatch to Irwin City, 8 miles, and to issue securities to pay for this extension, for freight terminals in Modesto and for other improvements of its system. The company wants to issue $600,000 of its common stock now in its treasury, to net $480,000 cash. The extension will cost $109,700. The remainder of the $480,000 will be devoted to procuring additional terminals.

Gainesville Railway & Power Company, Gainesville, Ga.—This company reports that it has just completed a 1-mile addition to its lines.

Savannah (Ga.) Electric Company.—It is reported that this company contemplates the construction of a 4-mile extension of its Millhaven line to Port Wentworth.

Chicago, Fox Lake & Northern Electric Railway, Chicago, Ill.—This company, which proposes to construct a line from Evanston to Palatine, has filed a petition with the Public Utilities Commission of Illinois asking for authority to issue capital stock to the amount of $362,700, to execute a mortgage for $2 000,000 and to issue bonds under the mortgage to the amount of $750,000. [Aug. 19, '16.]

Chicago, North Shore & Milwaukee Railroad, Highwood, Ill.—This company will rehabilitate all of its tracks in Waukegan. Work has already been begun on the County Street line.

Union Traction Company, Anderson, Ind.—This company has begun work on a new switch to be laid on South Meridian Street between Sixteenth and Seventeenth Streets. The switch will be permanent and will cost $2,000.

***Richmond, Ind.**—Plans are being proposed for the construction of an electric railway between Richmond and Fort Wayne, via Union City, Winchester, Portland and Decatur. E. J. Skehan, formerly general manager of the Muncie & Portland Traction Company, now leased by the Union Traction Company of Indiana, and D. C. Moore of Richmond are interested.

Iowa Railway & Light Company, Cedar Rapids, Iowa.—This company contemplates the construction of about 2 miles of track extensions to its present lines in Boone.

Bay State Street Railway, Boston, Mass.—This company will construct an extension to the Country Club at Nashua, N. H.

St. Paul Southern Electric Railway, St. Paul, Minn.—It is reported that this company will construct an extension to Cresco, Iowa.

Kansas City, Mo.—The W. K. Palmer Company, 919 Baltimore Avenue, Kansas City, Mo., announces that it is in the market for about 35 miles of interurban railway, including rails, ties, all track and overhead material, cars and substation equipment. The W. K. Palmer Company, consulting engineers, are in charge of the engineering and business matters connected with the Oklahoma & Northern Traction Company which proposes to construct a line from Bartlesville east to Miami and thence to Joplin, with a branch from Miami to Columbus, Kan., and another to Baxter Springs, from 130 to 135 miles.

Southwest Missouri Railroad, Webb City, Mo.—Work will be begun at once by the Southwest Missouri Railroad on the construction of an extension from Galena to Baxter Springs, Kan., and it is expected that the line will be in operation within eight months.

Salem & Pennsgrove Traction Company, Salem, N. J.—Plans are being contemplated by the Salem & Pennsgrove Traction Company to construct an extension from Salem to Quinton. Carl N. Martin, Philadelphia, secretary.

International Railway, Buffalo, N. Y.—So eager are officials of the International Railway to complete the new Buffalo-Niagara Falls express line and have it in operation early in 1917, that construction work through Tonawanda and North Tonawanda is now being rushed twenty-four hours a day. Most of the fill has been completed through these two cities and concrete abutments for most of the bridges are ready for the structural steel. Rails have been laid for part of the distance between Buffalo and Tonawanda and ties are now being laid between North Tonawanda and Niagara Falls. It is expected that one track will be laid before Dec. 31.

Panama Traction Company, Jamestown, N. Y.—It is reported that operation of gasoline cars has been begun by this company between Youngsville and Sugar Grove, 11 miles. Last spring rights-of-way were secured from Sugar Grove to Busti and surveys were made for two spurs from Busti, one extending to Jamestown and the other connecting with the Erie Railroad at Ashville. Rights-of-way have been secured from Ashville to Panama Rocks and construction work will be begun at once. This line will be extended to Erie, Pa. Several months ago the Panama Traction Company secured an option on Panama Rock and plans to develop it into a summer resort. R. L. Davis, Jamestown, is general manager. [April 22, '16.]

Toronto (Ont.) Suburban Railway.—The Ontario Railway Board is considering the advisability of constructing an extension of the Toronto Suburban Railway on Pape Avenue from Gerard Street.

Wilkes-Barre & Hazleton Railway, Hazleton, Pa.—It is reported that this company plans to construct an extension to Tamaqua.

South Fork-Portage Railway, Johnstown, Pa.—This company reports that it will place in operation the latter part of this month one-half of its proposed line between South Fork and Portage and the rest of the road will be rushed to completion. Robert Pearce, Portage, president. [March 25, '16.]

Citizens Traction Company, Oil City, Pa.—Work has been begun by this company reconstructing its track on Pearl Avenue from Seeley Street to the junction of the Hoffman and Pearl Avenue lines at Stout Street and Harriott Avenue.

Three Rivers (Que.) Traction Company.—This company reports that operation will soon be begun on its extension to Cap de la Madeleine. The total mileage, including the Wyagamack branch, is 4.2 miles, the trackage comprising 7500 ft. of 60-lb. rail and 14,750 ft. of 75-lb. rail. All special work is of flange bearing manganese insert construction. The overhead construction is the usual cross span, direct suspension system with No. 000 trolley and aluminum feeders. Derail protection, with light signals, has been provided at two steam railroad crossings.

Saskatoon (Sask.) Municipal Railway.—The City Council of Saskatoon is considering the connection of the Clarence Avenue line with the Second Avenue line via the new Twenty-fifth Street bridge. The estimated cost is $10,000.

Charleston & Summerville Interurban Railway, Charleston, S. C.—It is reported that the Charleston & Summerville Interurban Railway has filed deeds to right-of-way preliminary to resuming work on its proposed line between Charleston and Summerville, about 22 miles. J. L. David, Charleston, president. [April 11, '14.]

Chattanooga Railway & Light Company, Chattanooga, Tenn.—A report from this company states that it has just completed the construction of 9.5 miles of track.

Fort Worth & Denton Traction Company, Fort Worth, Tex.—A certificate of dissolution has been filed at Austin by the Fort Worth & Denton Traction Company. This company was organized several years ago to promote the construction of an electric interurban line from Fort Worth to Denton. The project has now been abandoned, and a movement has been set on foot for a line from Dallas to Denton. [Nov. 20, '15.]

Tarrant County Traction Company, Ft. Worth, Tex.—The proposition of an extension of the Tarrant County Traction Company to Hillsboro via Grandview and Itasca, has been taken up by the Cleburne Commercial Club. The matter is being favorably considered by the company.

SHOPS AND BUILDINGS

Kankakee & Urbana Traction Company, Urbana, Ill.—A contract has been awarded by this company for the construction of a small carhouse at Paxton.

New York Municipal Railway, Brooklyn, N. Y.—The Public Service Commission for the First District of New York has awarded a contract to Snare & Triest Company, New York, at $52,654, for the construction of concrete track floors and platforms over the mezzanines of eleven stations on the Culver line now under construction in Brooklyn.

Sand Springs Interurban Railway, Tulsa, Okla.—Announcement is made that work will be begun at once by the Sand Springs Interurban Railway on the construction of a four-story fireproof building at Main and Archer Streets for its general offices and terminal passenger station. The company will also erect a passenger station at the crossing on Third Street. The improvement will cost $150,000.

Johnstown (Pa.) Traction Company.—This company is rebuilding its office and shop building to give new locker and rest rooms for its trainmen.

San Antonio, Gonzales & Houston Interurban Railway, Houston, Tex.—This company, which proposes to construct a line from Houston to San Antonio, contemplates the erection of a number of small stations. Steeve Holmes, Leesville, president.

West Virginia Traction & Electric Company, Wheeling, W. Va.—This company will construct a new station at Atkinson's crossing near Reed's Mills.

POWER HOUSES AND SUBSTATIONS

San Diego (Cal.) Electric Railway.—This company contemplates the construction of a substation at Chula Vista.

United Railways & Electric Company, Baltimore, Md.—Work is under way by the United Railways & Electric Company on its new Belvedere Avenue substation. The West Construction Company, Baltimore, has the contract for the building and the Westinghouse Electric & Manufacturing Company has the contract for the complete electrical equipment, consisting of three 1500-kw., 375-r.p.m. rotary converters, nine 550-kva., 13,000-volt air-blast transformers, two blower sets, an air compressor and a small motor-generator set, necessary switchboards and switching equipment. The electrical apparatus will be installed early next year.

Interborough Rapid Transit Company, New York, N. Y.—A substation will be constructed by the Interborough Rapid Transit Company at 139th Street near Alexander Avenue. The structure will be 60 ft. x 100 ft., one story high, and will cost about $40,000.

Tidewater Power Company, Wilmington, N. C.—A report from this company states that it is constructing an extension to its boiler room and is installing a new boiler.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.—The capacity of the Lowellville power house of the Mahoning & Shenango Railway & Light Company will be increased at once. The capacity of the generating station was doubled last spring, when a 20,000-hp. turbo-generator was installed, making the capacity of the powerhouse 40,000 hp. Another General Electric turbo-generator will now be installed, bringing the total capacity up to 60,000 hp. The contract for the addition has been let to the Stone & Webster Engineering Corporation, which erected the addition completed only a few months ago. In all, considerably more than $1,000,000 will be spent on the improvement, which will include the new 20,000-hp. unit, batteries of Wilcox & Babcock boilers, even more extensive than those placed last spring; automatic stokers, a new big concrete stack, coal carrying and crushing equipment, and all other accessory equipment. All will be virtually duplicates of the equipment now in use. All will be housed in an addition to the powerhouse which will be approximately half the size of the present structure.

Wisconsin Traction, Light, Heat & Power Company, Appleton, Wis.—It is reported that this company has purchased a tract of land at Neenah for the construction of an electric light and power plant.

Manufactures and Supplies

EDWARD N. HURLEY ON THE INDUSTRIAL SITUATION

American Industries Should Prepare Now for Stiff Competition After the War—Function of the Trade Journals

In an address before the Associated Business Papers at New York on Oct. 27, Edward N. Hurley, chairman of the Federal Trade Commission, discussed the need for business efficiency and industrial improvement after the war. He said that we think of Europe as a continent engulfed in war, devastated and disordered, but actually, under the stress of a life and death struggle, every effort is being made to obtain the highest efficiency in the production, distribution and use of commodities of all kinds. Conservatism in industrial ideas and methods has been blasted and shattered to pieces in the shock of war. New processes are being discovered, new inventions are being made and new forms of organization are being created. Books on efficiency and scientific management are being bought by the hundreds and studied. Great Britain has made thirty years of industrial progress in thirty months, and in Germany, which before the war was probably the most highly organized and efficient manufacturing country in the world, organization and efficiency have been still further developed. All this calls for greater manufacturing and merchandising efficiency in this country.

Mr. Hurley spoke of various methods by which this efficiency could be obtained. One is by the prompt publication in the trade journals of any industry of the improvements in that industry and the utilization of this information by the business men in that industry. Another is by a more exact cost accounting system, particularly among the smaller manufacturers. Another is by co-operation in trade associations. Another is by more close association between government and business. If government and business could once understand each other, one-half of the problem of successful co-operation among American business men for legitimate and necessary ends will be solved. The members of Congress wish to do the right thing by the people of the country, but they cannot be expected to be familiar with business problems unless an active effort is made to bring the facts of business to their attention.

In conclusion Mr. Hurley discussed the functions of the trade paper in improving industrial efficiency and said, in part:

"In the last analysis success in business depends upon the intelligence of the individual manufacturer. If he does not understand both the details and the broad aspects of the industry of which he is a part, he cannot expect to be successful. Our foreign competitors read most every article published upon their business with great care and thoroughness. Many of them have duplicate copies of their favorite trade paper sent to their homes so that they may read them away from their business without being disturbed. Many foreign manufacturers contribute articles to these journals on phases of the business with which they are most familiar. Such articles are bound to be helpful and give a constructive effect. Our trade journals and technical papers are the best in the world. These papers are preaching the gospel of sound business on practical lines and are helpful not only to business, but to the country as a whole."

FOREHANDEDNESS IN ORDERING CARS BENEFITS PURCHASER AND MANUFACTURER

Referring to the article on "Forehandedness Desirable in Buying," which appeared on page 915 of this paper for Oct. 21, a prominent car builder in a letter just received confirms some of the arguments made and states that the subject should excite interest and action.

He points out that up to the present year there had not been more than half a dozen car orders placed by the railway companies sufficiently in advance of their requirements to enable the manufacturers properly to schedule the various shop operations so that the cars could be built at a minimum cost. This year, however, the situation has been different. It has been next to impossible for the car builder to get his raw materials, particularly metals, in anything like the regular period, so that of a necessity an opportunity has been accorded in several instances to lay out properly the schedule and run the cars through the shops for a minimum cost.

Another typical reason for delay in ordering has been the desire on the part of the railway company to avail itself of the very latest ideas in construction. This state of mind has operated against the purchasing at an early time in the hopes of obtaining results from later developments.

The car builder also cited the fact that market conditions with the possibilities of rising and falling markets, always influence the buyer to delay ordering until the very last minute. If the market is high he hopes that it will drop and if it is low invariably he hopes that it will go lower. The only condition that really gives impetus to buying is a rising market, and everybody buys more rapidly and more favorably on a rising market than on a falling market.

INCREASE IN CAR WHEEL WEIGHTS DESIRABLE

Recommendations of Association of Manufacturers of Chilled Car Wheels Call for Increased Weight in Wheels and Increase in Metal of Flange at Gaging Point

The following are extracts from the annual address of President George W. Lyndon, delivered at the annual meeting of the Association of Manufacturers of Chilled Car Wheels:

"The work of our association during the past year has been based largely upon the recommendations made to the Master Car Builders' wheel committee during the year of 1914. At this time we not only outlined a plan of procedure for the improvement of the chilled iron car wheel by which the safety element stood out prominently, but accompanied our recommendation with full data pointing out the weaknesses of the present M. C. B. standards. We also gave our reasons for recommended changes based upon the knowledge acquired from service records and the lifelong experience of the manufacture and service of the chilled iron wheel. Our recommendations were substantially as follows:

"1. An increase in the weights of the 625 and 725-lb. M. C. B. wheel;

"2. An 850-lb. wheel for cars of 140,000 lb. capacity;

"3. A flange for the 850-lb. wheel for use under the 70-ton cars with as much of an increase as would be acceptable to the American Railway Engineering Association.

"Since our organization in the year 1909, we have steadfastly maintained that the varied service in the 60,000-lb. class of cars made it imperative that the weight of the wheel should either be increased to meet the maximum conditions of service, or that we should have two standards in this class. The variation in service arises from the variations in the light weight of the car in the 60,000 lb. capacity class, and as the standard of operation is to brake the cars 60 per cent of their light weight, it must follow that any class of cars in which there is 100 per cent variation in light weight (which is common in the 60.000-lb. class) cannot with safety carry the same weight of wheel, and this is what the manufacturers have been required to do.

"The standard wheel specified for the 60,000-lb. class weighs 625 lb. and the light weights of the cars vary from 20,000 lb. to 53,000 lb. Our association recommended that the weight of the wheel be increased to 675 lb., which would provide a standard wheel which would meet the maximum conditions of service as to load and brake. In asking for an increase in weight of the two standards 625 and 725 M. C. B. wheels, we were not actuated by commercial considerations, but purely from the standpoint of safety.

"It is estimated that there are 2,500,000 chilled iron wheel renewals annually. If the weights should be increased 50 lb. each the additional metal to be purchased would approximate 62,500 tons, providing all the renewals required an increase, which is by no means the case. Many of the prominent railroads in the country representing more than a fourth of all the cars in use, are already introducing advanced standards and are using wheels much heavier than the present M. C. B. standards. The heaviest 725-lb. M. C. B. standard chilled iron wheel for 50-ton cars is lighter than the rolled steel wheel. Hence there is no good reason why the chilled iron wheel should be so limited in weight, particularly when the increase involves the nominal expenditure of $10 per ton, this being the difference between the scrap value of the old wheel, which is accepted in part payment for the new. The reduction in accident hazards would more than absorb the increased expense due to the nominal increase in weight.

"Ever since the introduction of the 50-ton car, our association has recommended an increase in the metal of the flange at the gaging point. A committee of the American Railway Engineering Association appointed for the purpose has reported that the manufacturers could increase this flange width 3/16 in. without any change in the present flangeways of track. The Master Car Builders' wheel committee has reported in convention that there be no changes in the dimensions and contour of flanges of car wheels as adopted in the year 1909. This flange was an improvement over the M. C. B. design and through the recommendation of our association we succeeded in reducing its height from 1⅛ in. to 1 in., which gave it greater strength and we know that we can make further improvements. It needs no argument to prove that a stronger flange is required for the 70-ton cars than for the 30-ton cars.

"Our association has made a very satisfactory arrangement with the University of Illinois through Dean W. F. N. Goss, in which it is agreed that the university experiment station will undertake an investigation concerning the stresses and behavior of chilled iron car wheels.

"In submitting a draft of this arrangement to the President of the University of Illinois, Dean Goss called attention to the fact that there are now in operation in the country approximately 20,000,000 freight car wheels, and the demand for renewals alone involves the manufacture of 2,500,000 chilled iron car wheels per year.

"No other type of wheel has ever made serious inroads on the chilled iron wheel and never will, providing we are all alive to the increased demands of service, and for two-thirds of a century the chilled iron car wheel has remained the standard for the nation's commerce."

The officers elected for the ensuing year are the following: George W. Lyndon, president-treasurer; E. F. Carry and J. A. Kilpatrick, vice-presidents; George F. Griffin, secretary; F. K. Vial, consulting engineer. The board of directors is as follows: E. F. Carry, president Haskell & Barker Car Company; W. S. Atwood, chief engineer, Canadian Car & Foundry Company; Charles A. Lindstrom, assistant to president Central Carwheel Company; F. K. Vial, chief engineer Griffin Wheel Company; A. G. Wellington, president Maryland Carwheel Works; W. C. Arthurs, president Mount Vernon Car Manufacturing Company; J. D. Rhodes, president National Carwheel Company; F. B. Cooley, president New York Carwheel Company; A. J. Miller, general manager Ramapo Foundry & Wheel Works; William F. Cutler, vice-president Southern Wheel Company, and J. A. Kilpatrick, president Albany Carwheel Company.

F. O. GRAYSON PREDICTS BETTER BUSINESS IN THE SOUTHWEST

General Business Conditions Are Improving, Traffic Reviving, One-Man Cars Popular

"Practically no new railway work has lately been started in the Southwestern states, but general conditions are such that the railway supply people may look for good business from there before long." This statement was made recently by F. O. Grayson, president Grayson Railway Supply Company, St. Louis, Mo. Mr. Grayson for years has enjoyed intimate sales contact with the electric railways of the South and Southwest, particularly in the states of Missouri, Oklahoma, Texas, Arkansas and Louisiana.

Speaking of conditions in Texas, Mr. Grayson said that the electric roads had recently been buying only operating necessities. Revenues and expenses were such that no other course could be followed. For example, the jitney competition in many other parts of the country had largely become an unimportant factor, but in most parts of Texas the jitneys were still doing 75 per cent as much business as they ever did. Street railway traffic, however, Mr. Grayson said, was showing a steady growth and even with the jitneys as persistent as they are some roads were beginning to show increases over earlier days.

The underlying conditions in the cotton states warrant the statement that railway supply business will be much better within a year. The cotton growers last year were but slowly recovering from the previous year's loss on the cotton crop. Now cotton is priced around 18 cents a pound—more than twice the prices of 1914. By the end of this year the former will have received their money for this year's crop and they will then commence local buying. This means better business at once for the trolley lines and, in turn, more orders for the material manufacturers.

In Mr. Grayson's opinion the small, light, safety type of car, which can be operated by one man, will be largely bought by the Southwestern roads when the traffic requires additional equipment.

COMMERCE BUREAU REQUESTS CATALOGS FOR VALPARAISO, CHILE

The Bureau of Foreign and Domestic Commerce through Norman L. Anderson, commercial agent of the Chicago office, 504 Federal Building, advises that the National City Bank of New York will soon open a branch in Valparaiso, Chile, and that it will be glad to receive catalogs of American manufacturers to be placed on file for the use of interested parties. Copies of catalogs should be sent postpaid to the National City Bank of New York, Box 1508, Valparaiso, Chile.

ROLLING STOCK

Central Illinois Public Service Company, Mattoon, Ill., is reported to be considering the purchase of nine small cars.

Jackson Railway & Light Company, Jackson, Tenn., noted in the ELECTRIC RAILWAY JOURNAL of Sept. 9, 1916, as being in the market for two one-man car bodies, has purchased this equipment from the Southern Car Company, High Point, N. C.

Oklahoma & Northern Traction Company, Bartlesville, Okla., through its consulting engineers, the W. K. Palmer Company, Kansas City, Mo., is receiving bids on four interurban cars, three city cars, two baggage cars and two electric locomotives.

TRADE NOTES

Charles N. Wood Company, Boston, Mass., has recently moved from 79 Milk Street to 14 Federal Street.

U. S. Metal & Manufacturing Company, New York, N. Y., has received an order from the United Traction Company of Albany, N. Y., for twenty Johnson fare boxes.

Perry Ventilator Company, New Bedford, Mass., has received an order to equip with ventilators the forty-two cars recently ordered by the Boston Elevated Company from the Pressed Steel Car Company.

Barnes & Kobert Manufacturing Company, New Britain, Conn., announce that the corporate name of the firm has been changed to the B & K Manufacturing Company. The executive and general offices of the company are now located at the New Britain factory.

George O. Smalley has been promoted to first vice-president and general manager of the Bound Brook Oil-less Bearing Company, Bound Brook, N. J., succeeding the late Leigh S. Bache. Mr. Smalley has been connected with this company for the last ten years, for the last four years in the capacity of assistant general manager and assistant treasurer. He is therefore thoroughly conversant with the methods of both the sales and production departments of this rapidly growing business.

Westinghouse Air Brake Company, Wilmerding, Pa., at the annual meeting of stockholders held on Oct. 17, re-elected the president and board of directors for the coming year. Under a new arrangement the ranking officer of the company, H. H. Westinghouse, will be the chairman of the board. The other officers elected to complete the organization are: John F. Miller, president; A. L. Humphrey, vice-president and general manager; S. C. McConahey, acting vice-president; R. F. Emery, secretary and treasurer, and Charles A. Rowan, controller.

T. C. White & Company, St. Louis, Mo., report that the overhead line material manufacturers have been forced to raise their prices in accordance with the increases in the costs to them of copper, tin, zinc and malleable castings. Thus the prices for the ordinary styles of insulated trolley hangers have so increased that the porcelain insulated trolley hangers may now be sold on a more equal price basis. The porcelain insulated hanger manufactured and sold by this company consists of but three parts: a hanger bolt, a porcelain spool through which the bolt passes, and a malleable-iron yoke surrounding the spool and hooking over the span wire for support. For several years it has been necessary to base the claims for the sale of this type of hanger on its long life due to non-deterioration of the insulation and on the high insulating qualities gained from the use of porcelain rather than composition. Now the increase in the price of bronze has brought the cost of ordinary hangers up to such a point that it comes within the selling range of the porcelain insulated hanger. This evening of prices is bringing about an increase in the number of porcelain insulated hangers sold. The white type F porcelain trolley hanger has been regularly used since March, 1914, when it was first installed in actual service on the lines of the East St. Louis & Suburban Railway. Samples have been under test for three and one-half years. Mr. White states that his company has a generously large reserve supply of malleable yokes on hand and that the porcelains, which are made by the dry process, can be obtained readily, so that deliveries on porcelain insulated hangers can be made within a week. In addition to an increased number of inquiries from local roads, Mr. White reports an exceptional number of foreign inquiries.

ADVERTISING LITERATURE

E. C. Atkins & Co., Indianapolis, Ind., has issued a pamphlet on the Atkins "Kwik-Kut" power hack saw machine.

American Cotter Pin Company, Pittsburgh, Pa., has issued a bulletin on its Kelkoter self-spreading cotter pin.

Ohmer Fare Register Company, Dayton, Ohio, has issued a catalog of parts for fare registers and equipments.

McQuay-Norris Manufacturing Company, St. Louis, Mo., has issued a pamphlet on its leakproof piston rings.

U. S. Metal & Manufacturing Company, New York, N. Y., has issued a pamphlet on Clapp's fire resisting paints.

Eclipse Railway Supply Company, Cleveland, Ohio, has issued a folder describing and illustrating its Acme fender, Eclipse wheel guards and Eclipse life guards.

Sangamo Electric Company, Springfield, Ill., has just issued an illustrated pamphlet describing its type D5 two-wire and three-wire direct-current watt-hour meters.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued circular No. 1571 describing and illustrating its drum-type controllers for railway service.

Joseph Dixon Crucible Company, Jersey City, N. J., has issued a little booklet on "Paint for Roofs" containing testimonials from a number of users of its silica-graphite paint.

Anglo-American Varnish Company through its agent, the U. S. Metal & Manufacturing Company, has issued a bulletin on the AA shop cleaner for scouring and cleaning coaches.

Wasson Engineering & Supply Company, Milwaukee, Wis., through its agents, Holden & White, has issued a pamphlet on the Wasson type NR. non-retrieving trolley base for city cars.

Reliance Ball-Bearing Door-Hanger Company, New York, N. Y., which is represented by the Ellcon Company, has issued an illustrated catalog describing its door hangers and appliances.

Electric Service Supplies Company, Philadelphia, Pa., has issued a pamphlet on a wear-proof mat. This mat is constructed from units composed of felt and metal strips. The mat rolls up like a rug and can be conveniently stored.

The Ellcon Company, New York, N. Y., has issued a pamphlet showing the installation of its white porcelain enameled stanchions with special metal fittings installed in one of the new cars of the New York Municipal Railway Corporation.

Indianapolis Switch & Frog Company, Springfield, Ohio, has issued a pamphlet giving a partial list of users of Indianapolis electric welders and welded joints. This pamphlet also shows the different types of Apex and Simplex joints for girder and high T-rails.

Peter Smith Heater Company, Detroit, Mich., has issued bulletin No. 8 on thermostats for electric car heaters. This bulletin shows schematic diagrams of the electric car heater thermostat control along with descriptions and illustrations of the automatic switch, interlock knife switch and of a thermometer.

Nachod Signal Company, Louisville, Ky., has issued a booklet describing signal systems which includes a number of types. In this pamphlet are illustrated a few representative illustrations of this company's equipment showing their application to both city and interurban requirements.

C. D. Pruden Company, Baltimore, Md., has issued a catalog on its Prudential portable fireproof steel buildings and garages. One of the garages which is described and illustrated is that owned by the Rapid Transit Subway Construction Company and is installed at Madison Avenue and Forty-second Street, New York, N. Y.

Railway Improvement Company, New York, N. Y., has issued an operating and engineering data book on its Rico coasting recorder. This twenty-four-page publication contains descriptions and illustrations of coasting time recorders and terminal clocks installed on several large city railways and also shows graphically the entire operation of the coasting recorder system.

Gurney Ball-Bearing Company, Jamestown, N. Y., has just issued Catalog H2 on Gurney ball-bearing hangers. This forty-page catalog describes and illustrates drop hangers, post hangers, adapter bearings, floor stands, rigid pillow blocks and loose pulley adapters. Six pages of this catalog are devoted to pulley and belt data, horsepower of shafting, size of keys, etc. In addition application of some of these above-named devices are illustrated.

Goldschmidt Thermit Company, New York, has just issued pamphlet No. 12 on the thermit process of rail welding. The method of inserting the weld, preheating the rails and completing the weld with thermit by which a liquid steel is created at 5000 deg. Fahr. and poured around the rail is fully described and illustrated. The welding of a compromise rail joint between the "T" rail and groove rail and also the modification of the "Clark" joint is given in considerable detail.

General Electric Company, Schenectady, N. Y., has just issued bulletin No. 44,419 on railway motor gears and pinions. This bulletin describes and illustrates forged gears, solid cast-steel gears, split cast-steel gears, composite gears and spring gears. It also shows types of popular wheel-press jigs and a pinion pulley. A section of the bulletin containing ten pages is devoted to gear formulas, classification and principal dimensions of General Electric and Westinghouse gears and comparative sizes of gear and pinion teeth.

NEW PUBLICATIONS

Reasonableness and Legal Right of Minimum Charge in Public Utility Service. By Samuel S. Wyer, Columbus, Ohio. Reprinted by American Gas Institute, 29 West Thirty-ninth Street, New York, N. Y. Eighty-two pages. Paper, $1.

The necessity of the minimum charge to prevent discrimination and compel each class of consumer to pay for the service received, is demonstrated in this book, as well as the fact that there are ample precedents for making the minimum charge proportional to the size of the consumer's demand for service. The various decisions underlying these principles are quoted, and two alphabetical tables of adjudicated and non-adjudicated monetary allowances for such charges in existing rate schedules are presented. Extra copies of the book can be secured from the secretary of the American Gas Institute, George G. Ramsdell, at the following prices: Twenty-five copies, $20; 100 copies, $50, and 500 copies, $200.

Rubbing Grease on a Fat Pig

That's a typical expression from John Bull's other island for superfluity.

Shakespeare puts the same thought with greater elegance, thus: To paint the lily, to gild refined gold, to smooth the ice, to add another hue to the rainbow.

It may seem superfluous to say so much about the **PEACOCK BRAKE** when it is already known so well through its actual, widespread use in every class of electric railway rolling stock.

But a railway man's life is a mighty busy one, and these little talks about **PEACOCK BRAKES** serve to remind him how well they are working on his present cars and how essential it is that they should be specified on his new ones.

And, further, these advertisements are a standing invitation to draw fully upon our experience in this important branch of electric railroading, whether or not you are thinking of buying brakes today.

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The Service Department is ready to serve you, Mr. Manufacturer.

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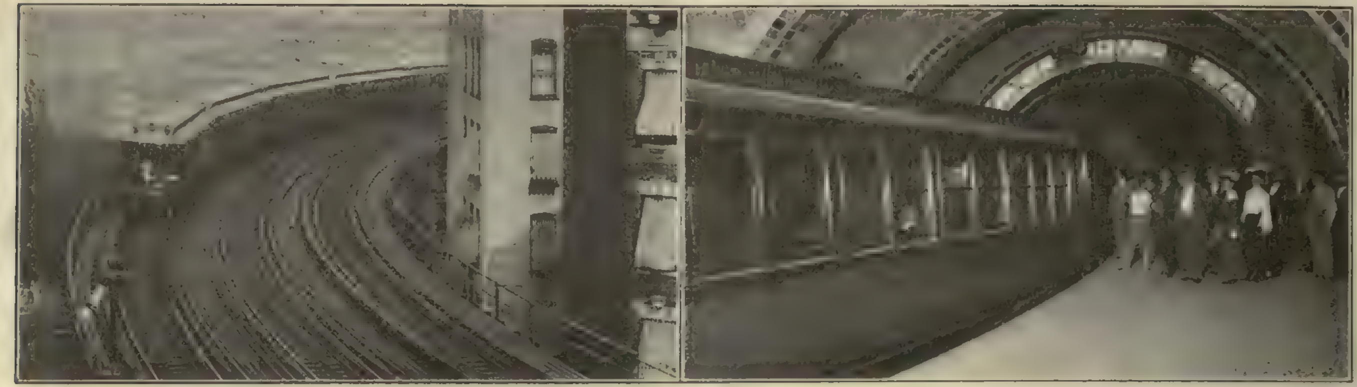

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D & W Fuses enjoy the 100 per cent confidence of the Interborough because they **deserve it**—they are the only fuses which live up to the severe demands of the world's greatest railway.

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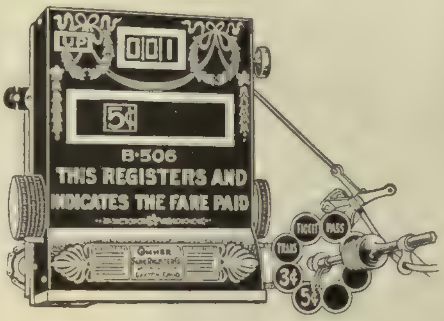

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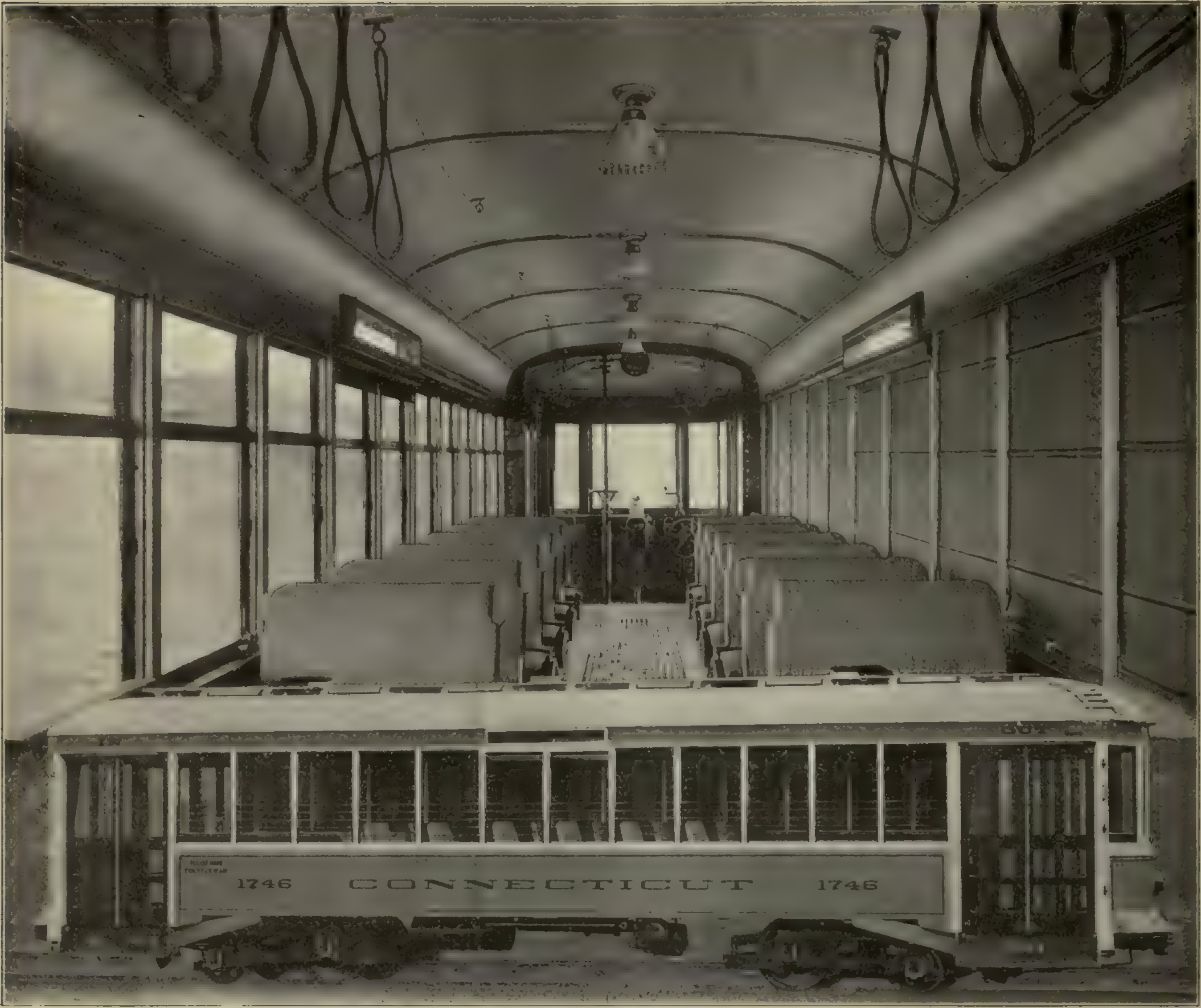

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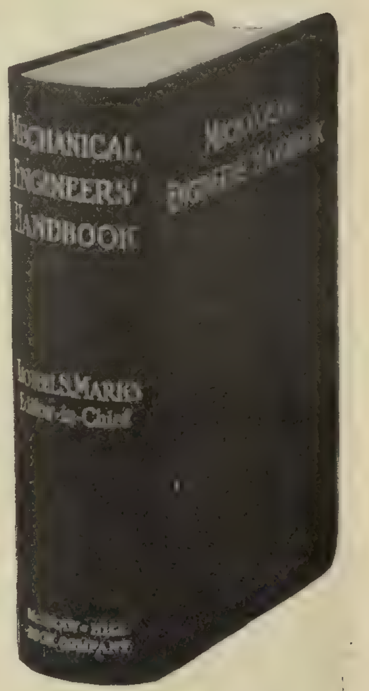
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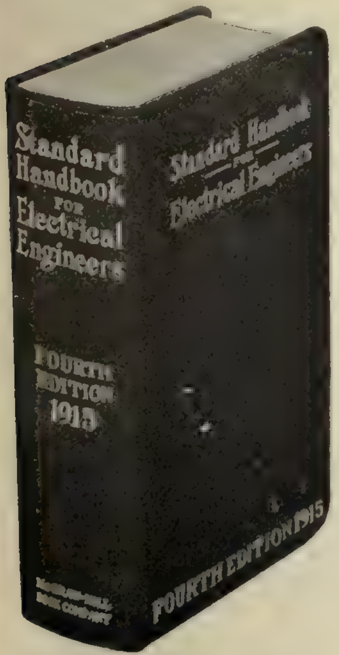

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Horse-car days.

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Yet within this short space of years we have seen the electric car develop into a 60-ton palace, riding as smoothly as thistledown in the air at speeds as high as 70 miles per hour.

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Can you comprehend what this ever-increasing service has demanded of the car wheel manufacturer?

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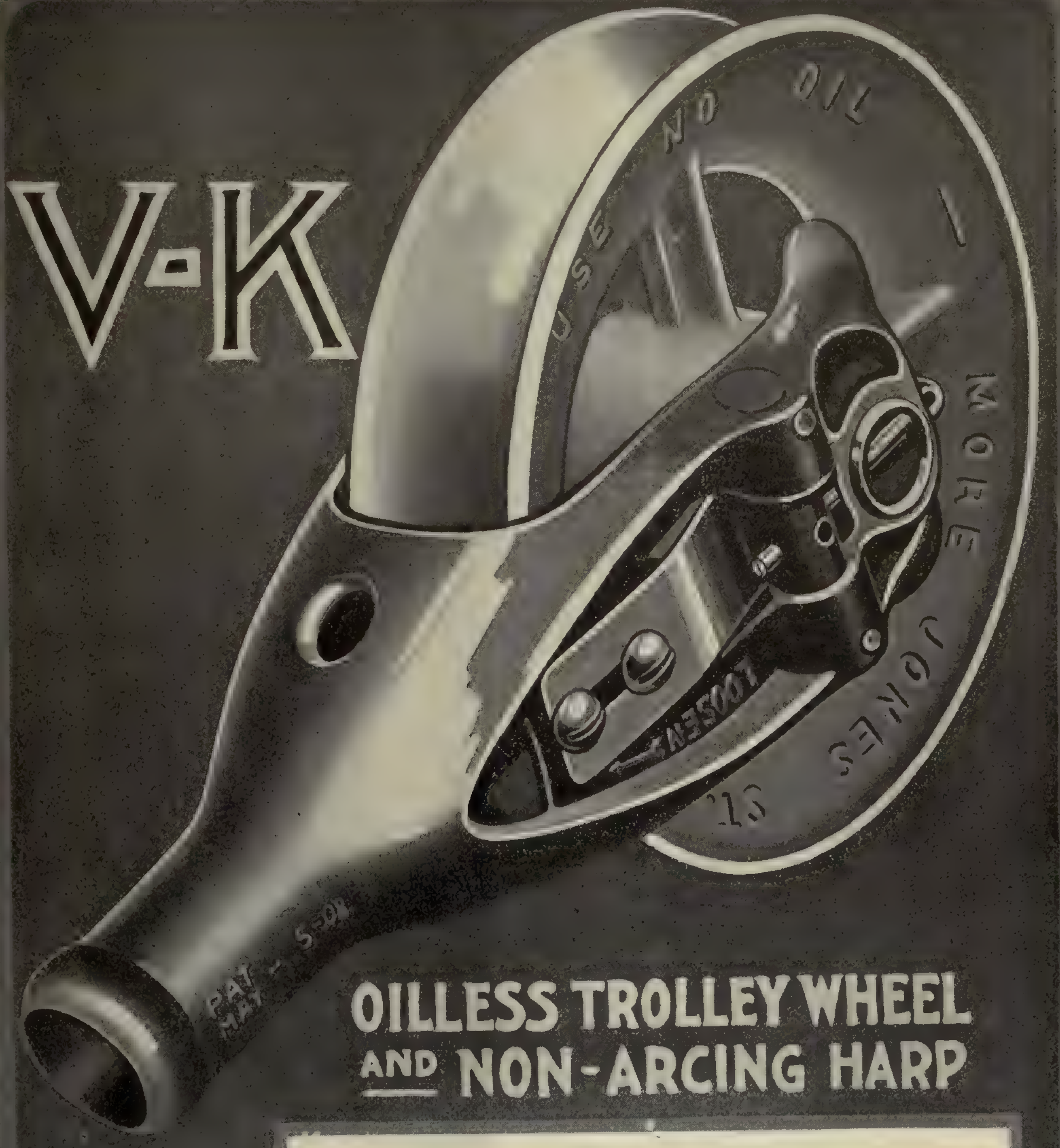

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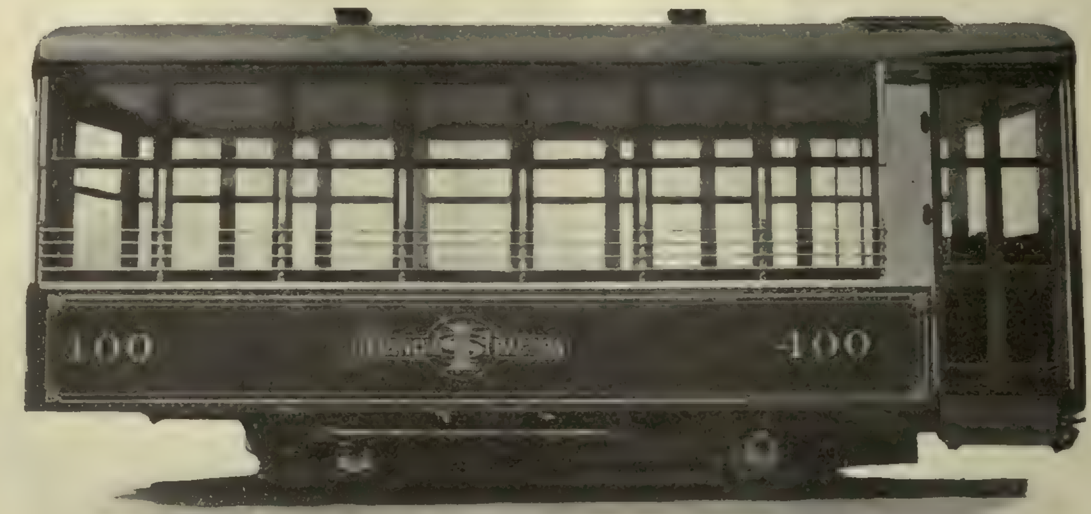

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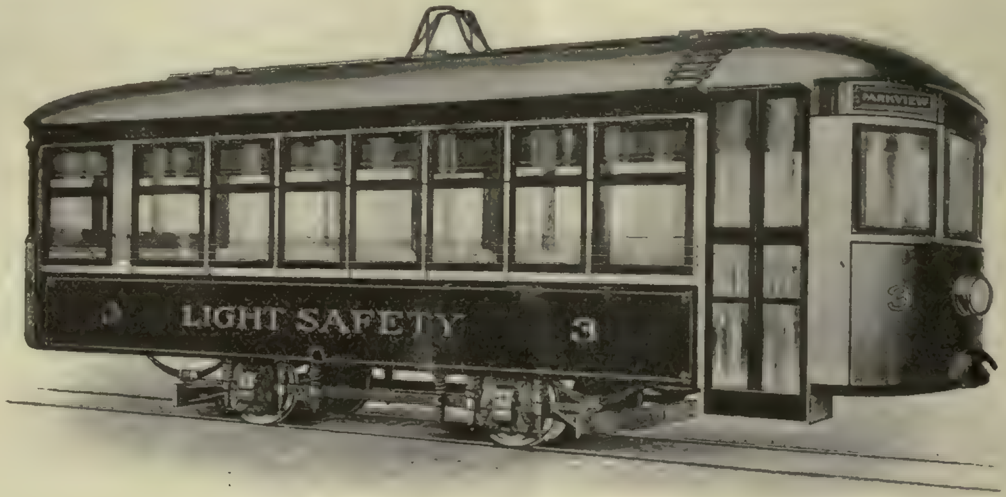
Among the many exhibits of interest at Atlantic City this year, our "LIGHT-SAFETY" car was easily the most interesting. It can safely be said there was not a railway man at the Convention who failed to inspect it.

It is so obviously **the adequate equipment** to keep **down** operating costs and bring **up** earnings, that it was bound to attract the favorable attention it did and earn the praise it received.



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Our confidence in the permanent success of this cost-saving equipment is based on what successful operating men think of it.

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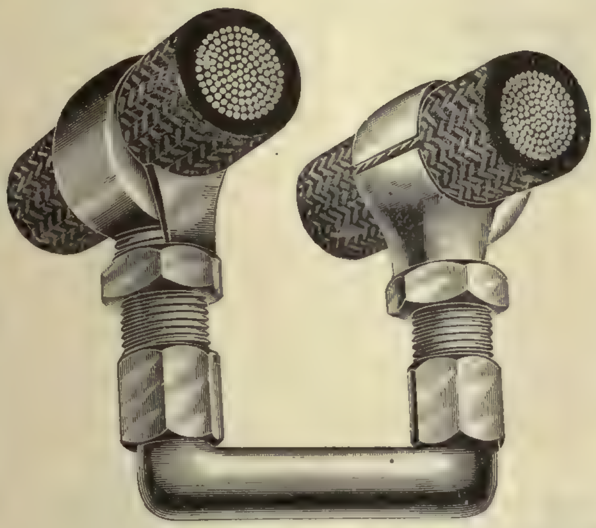

says the expert wireman or cable splicer. "Cut out those flossy soldering tools.

"I can do more work in less time with Dossert Connectors and a wrench than two men can do with those fancy things you're trying to hand me."

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That's what Dossert efficiency means. Our catalog is yours when you want it.

Dossert Cable Taps
for Equalizing

DOSSERT & COMPANY

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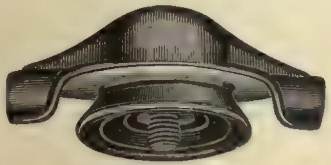

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and successfully cut maintenance costs if you turn to

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of strain insulators, hangers, splicing ears, crossings, and other overhead material.

They are "specialty" products, designed and built to make "Macallen" the standard on American railways.

It will pay you to write for information and prices.

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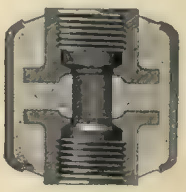

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That one is more economical than another—

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Made to Wear To Wear Well

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True up the commutator surfaces and equip the machines with

DIXON'S GRAPHITE BRUSHES

These self-lubricating brushes will maintain the smooth, dark surface on the commutators that means continued silent operation.

Incidentally you will obtain higher motor efficiency and notice a marked decrease in repair bills.

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M-27

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Why of course we are; the

Ford Tribloc
CHAIN HOIST

has been a success right from the start—and there are good reasons for it; for instance, Steel working parts, in place of iron used on most other hoists, add to the durability and safety of the Tribloc.

Then there is the patented Loop Hand-Chain Guide which is a part of standard equipment. It is a real safety feature, especially where speedy operation is essential. We build the Tribloc the best we know how, of the best materials and workmanship, sell it at a fair price and stand back of it with a guarantee that protects the purchaser for years.

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Protection where high voltage wires interlace requires extra defensive measures

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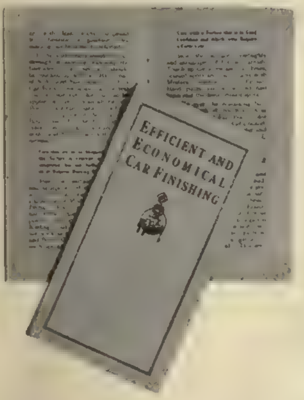

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Wheaton, Ill.

SCRAP is worth a lot of money these days, but new parts are worth a lot more. And that's just what OXWELDING will do for you—give you new parts for old ones.

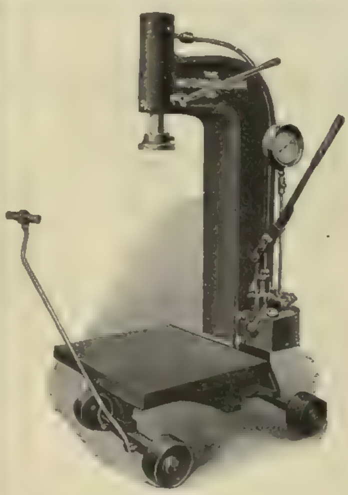
Other railways are doing all sorts of profitable things with Oxweld Equipment—making savings that *you* could make in *your* shops—repairing broken castings and forgings, building up worn rails, repairing broken frogs and switches, rail bonding. One road is even cutting out new car parts from heavy steel plates; says they're better than forgings, and, of course, much cheaper. Oxweld Equipment is a whole machine shop, store room and emergency crew combined—all in one light, easily-handled one-man unit, ready for business anywhere, any time; simple, dependable, economical. Bulletin Series 700-R will tell you many vital things about saving maintenance expense; it's a regular handbook of Street Railway Economies. You ought to have it. A post card will do.

OXWELD ACETYLENE COMPANY

Newark, N. J. Chicago
Los Angeles

Hydraulic Machinery

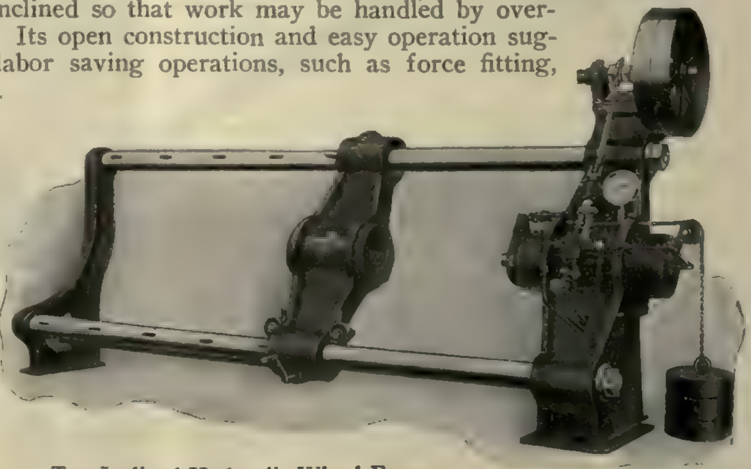
Labor-Saving Economical
Efficient



30 Ton Portable
Hydraulic Bushing Press

This open jaw portable forcing press is handy for forcing sleeves, bushings, mandrels and similar work. It is a self contained tool, the power being supplied by a detachable hand power pump mounted at the side of the press in a convenient position of operation. The ram may be brought to the work rapidly and returned by a rack and pinion operated by hand lever shown in cut.

We build many sizes and types of press designed to force wheels on axles, assemble fly wheels to shafts, etc. One of these is shown below. It is built inclined so that work may be handled by overhead crane. Its open construction and easy operation suggest many labor saving operations, such as force fitting, bending, etc.



100 Ton Inclined Hydraulic Wheel Press

These are two of our large line of hydraulic tools especially designed for railway use, such as pipe benders, rail benders, bending presses, shears, lifts, jacks, etc.

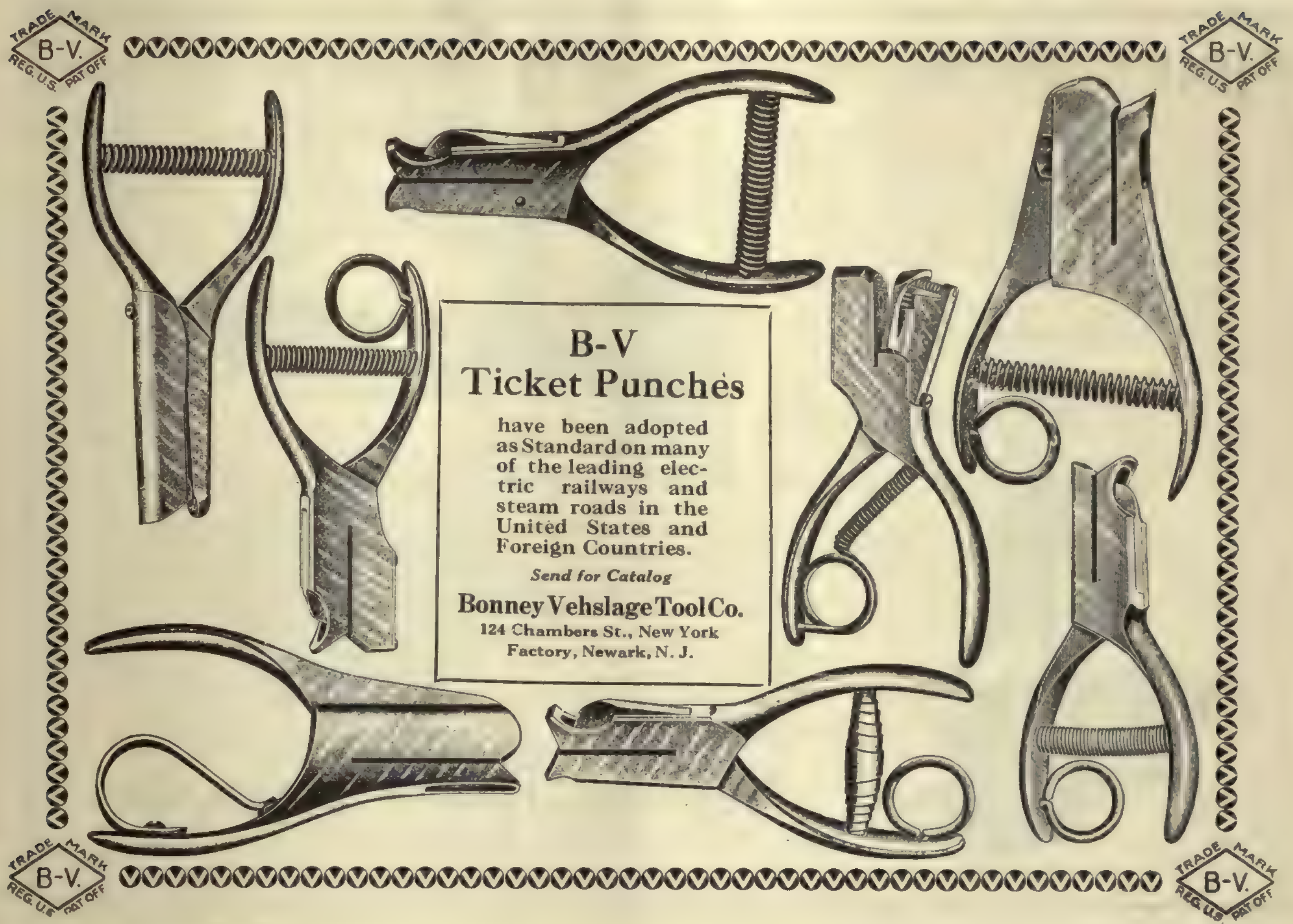
Write for catalogs.

The Watson-Stillman Co.

46 Church Street, NEW YORK

Chicago, McCormick Bldg.
Pittsburgh, Brown & Zortman.
St. Louis, Corby Supply Co.
Kansas City, Geo. T. Cook.
Denver, L. C. Ulrich.

332



TRADE MARK B-V. REG. U.S. PAT OFF

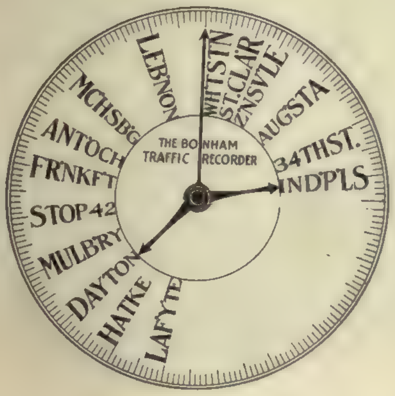
B-V
Ticket Punches

have been adopted as Standard on many of the leading electric railways and steam roads in the United States and Foreign Countries.

Send for Catalog

Bonney Vehslage Tool Co.
124 Chambers St., New York
Factory, Newark, N. J.

Auditing Expenses are Lower



Because the complete record afforded by the Bonham Traffic Recorder needs no compilation or checking. It is ready to be placed on your company's books.

BONHAM Traffic Recorders

keep tab on the traffic while on the road. They do away with the need for elaborate computations. When a Public Service Commission calls on you for data as to "Earnings per Passenger Mile," YOU HAVE THE FACTS—if your cars are BONHAM-Equipped.

The Bonham Recorder not only records cash but it keeps tab on passenger-mileage—the unit needed in computing operating costs and earnings.

Write for the Illustrated Book "Earnings Per Passenger Mile."

THE BONHAM RECORDER CO.

Hamilton, Ohio, U. S. A.

High Trolley Maintenance Costs Flee Before the Bayonet

A Bayonet Harp will run continuously for four or five years. Our first Base, made ten years ago, is still giving perfect service. All wearing parts are renewable at very small cost.
BAYONET EQUIPMENT COSTS NO MORE than the old antiquated equipment that delays your cars a half hour or more to change a damaged trolley wheel or pole. Accidents seldom happen with our easy system of daily inspection.

Bayonet Anti-Friction Base has all wearing parts bushed.
Self-Lubricating. Non-Breakable, Poles Changed in One Minute.

ONLY TWENTY SECONDS AND YOUR HANDS ARE REQUIRED TO CHANGE A HARP HEAD AND WHEEL

if you use BAYONET HARPS AND BASES. All repair work, lubricating and aligning done at the work bench, the only place it can be done right. Perfect alignment and lubrication saves wheels. Trolley axles have extra long bearings and are held more firmly than any other harp on the market. This feature with the extra large contact washers insures a true running wheel and perfect conductivity. We have the evidence that WHEELS IN BAYONET HARPS WEAR A THIRD LONGER than in other harps.

You can get the evidence in your own service by 60 DAYS' TRIAL.

It costs you nothing if we don't make good.

Bayonet Trolley Harp Co.
Springfield, Ohio, U. S. A.

The Lehigh Valley Transit Co.'s New Center-Entrance Interurbans

are equipped with

EDWARDS
Sash Fixtures

These cars, just delivered by the Southern shops, are the finest pieces of rolling stock on the Liberty Bell Route. Every detail of equipment was selected with an eye to the comfort and protection of passengers—so "Edwards" was written into the sash fixture specifications.

The Edwards Sash Fixture Catalog will assist you in selecting fixtures for new or old cars. Write for your copy.

The O. M. Edwards Co., Inc. Syracuse, N. Y.

Window Fixtures
Top, Bottom and Side Weather Stripping
Metal top Casings
Metal Extension Platform Trap Doors
All-Metal Sash Balances and Shade Rollers
Railway Devices

Sleet Storms Give No Warning

of their approach—so don't be caught napping. Provide a full equipment of

Anderson Sleet Wheels and Cutters

for every car on the line—**now.** Prevent the tie-ups, tangling of schedules and losses of revenue that ice-coated trolley wires will bring to an unprepared road.

We can fill your order **now** from stock. Write or wire our nearest office.

Albert & J. M. Anderson Mfg. Co.

289-93 A Street, Boston, Mass.
Established 1877

Branches—New York, 135 B'way. Philadelphia, 429 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St. London, 48 Milton Street.

For High Speed Operation

—Large Diameter Kalamazoo Trolley Wheels

As a solution to arcing and short wheel life on high speed electric railway work, two new Kalamazoo Wheels have been designed.

They are (No. 20) 11½ inches and (No. 21) 10 inches in diameter. An ample increase of width, depth of groove and length of hub insures a well-balanced wheel in each case.

Tests covering considerable mileage at high speeds show that these two new "Kalamazoos" greatly decrease sparking, while offering longer wheel life. There is more bearing on the wire, with consequent greater contact and current carrying capacity.

The patented Kalamazoo Harps have been enlarged to carry these wheels.

Try several on your lines. Compare their service with that of smaller wheels.

Write Today.

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KALAMAZOO, MICHIGAN

ENDURANCE

finds its most artistic manifestation in the temples of ancient Greece—its most practical manifestation in

"Le Carbone" Carbon Brushes

To use them is to terminate a host of brush troubles. They are Efficient—Economical—Uniform. It is never too soon to begin using them.

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Pittsburgh Office:
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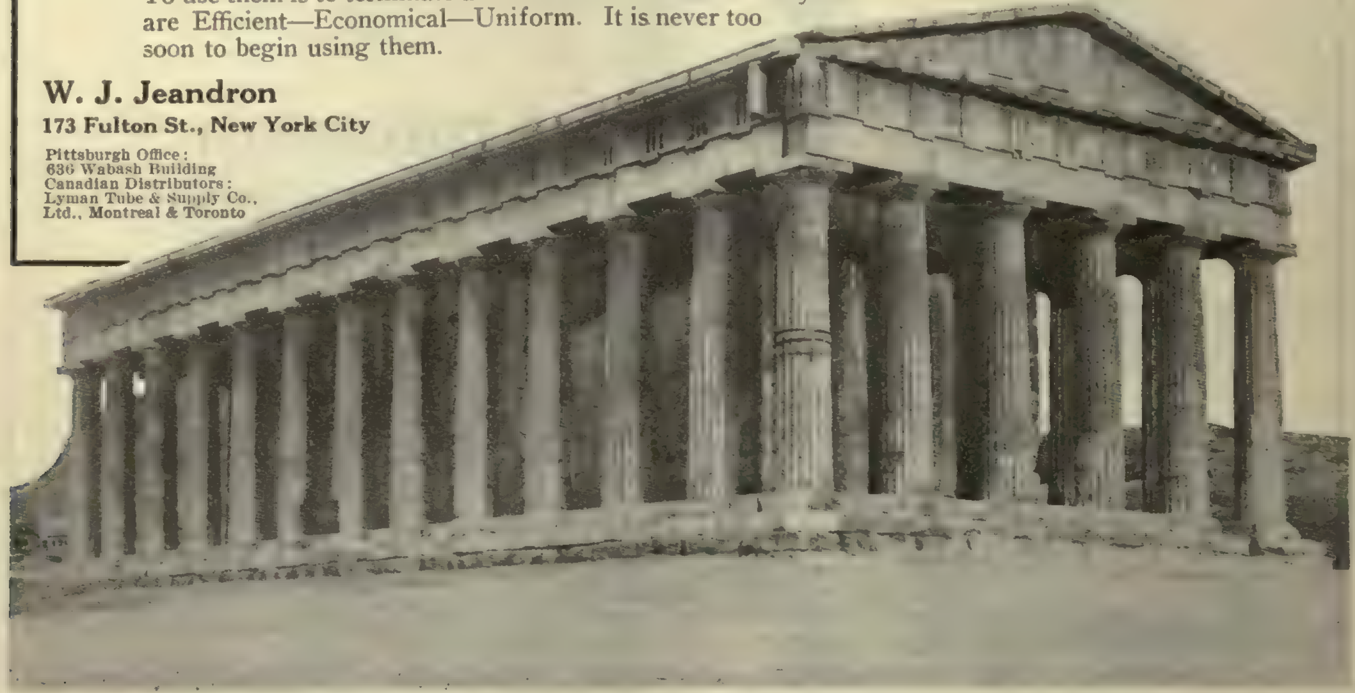

Makers of Carbons for Electrical Purposes for the Past Twenty-Five Years

Carbon Electrodes Motor and Generator Brushes Battery Carbons

The Plant Behind the Speer Brush

Speer Carbon Co. Dept. "J". St. Marys, Pa.

Steel for Service

All Carnegie Wheels Are Rolled from Cylindrical Discs

The service of wheels depends on the quality of material and workmanship which enter into their manufacture.

Carnegie Steel Wheels are rolled from carefully selected rolled cylindrical discs.

The high grade of steel in the discs and the method of rolling from the discs produce the best wheels ever manufactured.

Carnegie Steel Company

General Offices: Pittsburgh, Pa.

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CHILLINGWORTH
Drawn Steel
Seamless and Rivetless
Cases

No railways can afford to haul a heavy malleable iron gear case. They know too well that such a case only adds excess weight and cost to the car without affording any advantage. Moreover, they also know it costs more to buy.

You can figure on saving about 40% in weight and a proportionate amount in cost, by using Chillingworth Cases.

THAYER & COMPANY, INC., Selling Agents in U. S. and Canada **111 BROADWAY, NEW YORK**

The demand for our material is so great that we earnestly recommend our customers to anticipate their needs as much as possible.

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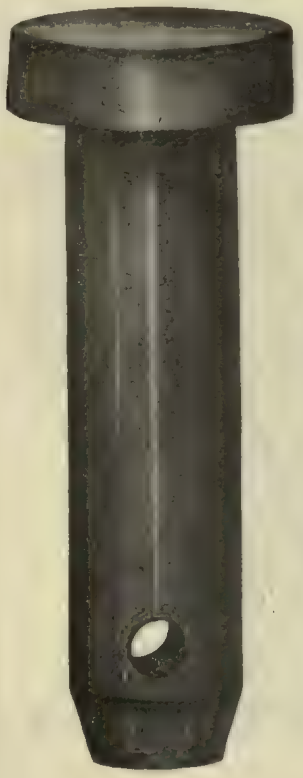


Bemis Car Truck Co. Acquires All Rights to Lord Baltimore Trucks

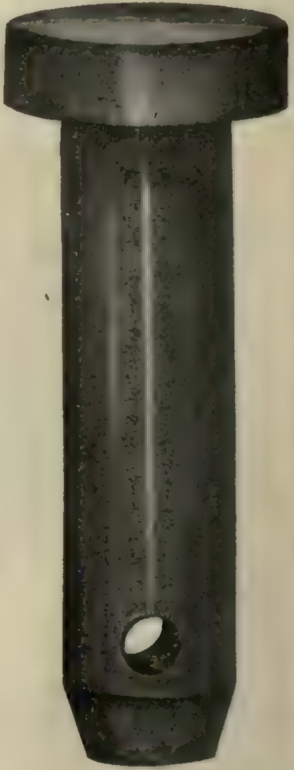
We are pleased to announce that we have acquired from the Baltimore Car Wheel Company, Baltimore, Md., all patent rights, good will, patterns, etc., in connection with the manufacture of the Lord Baltimore truck. We are also pleased to state that in the near future we will be able to supply the needs of all customers for replacement parts of every description.

The same faithful service that we are giving you in supplying

Boyerized Pins and Bushings

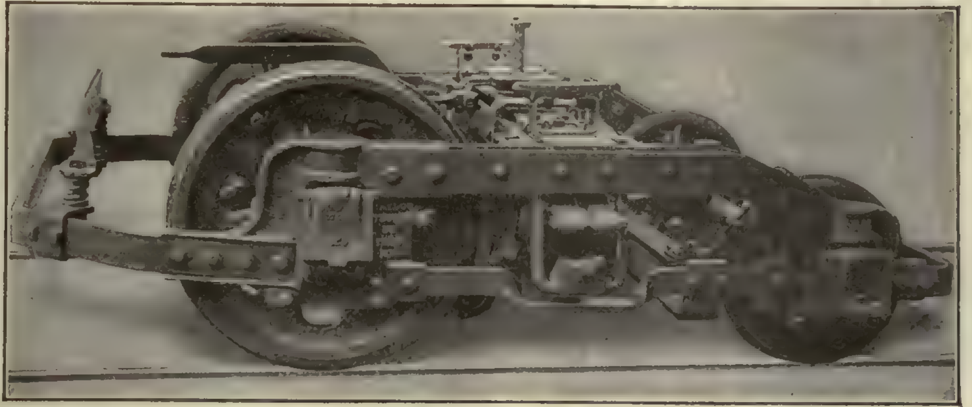
and other under-car details, including turnbuckles, will be yours in handling this important addition to our business.

We bespeak your continued patronage.



Bemis Car Truck Co., Springfield, Mass.

TAYLOR MAXIMUM TRACTION TRUCK



12 FACTS REGARDING "TAYLOR-MADE" TRUCKS

- ABSOLUTELY SAFE
- RIDE LIKE PULLMANS
- SIMPLE IN CONSTRUCTION
- REDUCE WEAR OF MOTORS
- WILL INCREASE DIVIDENDS
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- SAVE POWER
- SAVE ROAD BED
- LIGHT IN WEIGHT
- OVERCOME FLANGE WEAR
- BRAKES DO NOT CHATTER
- PREVENT SIDE OSCILLATION OF CARS

TAYLOR ELECTRIC TRUCK CO.
Established 1892
TROY, N. Y.

SPECIFICATIONS ON REQUEST

SEND FOR PORT-FOLIO

IF YOU WANT PROOFS

of your advertisements, and time to return them with corrections

Copy Must Be in Our Hands Two Weeks in Advance of Publication Date

Copy Changes. If no proofs are desired your advertisements should be in our hands Wednesday of the week preceding date of publication, otherwise your latest advertisement in accordance with schedule will be repeated.

New Advertisements (not changes of copy) can usually be accepted up to noon Wednesday of the week of publication, but no guarantee can be given as to location or proofs or indexing.

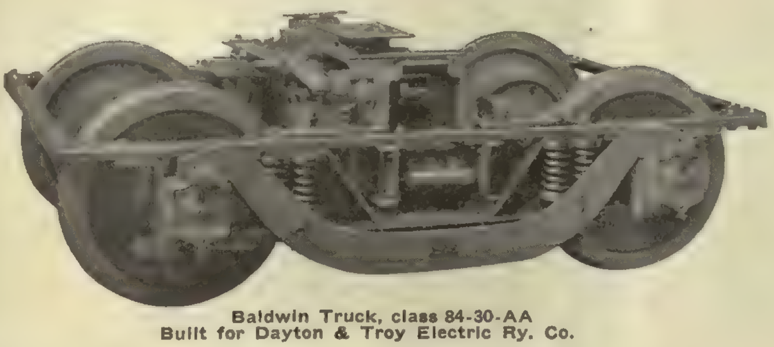
Searchlight Advertisements (Proposals, Wants, For Sale, etc.) received as late as 10 A. M. Thursday will be published if there is space available in the pages that go to press last. The paper is dated and mailed Saturday.

THESE are not arbitrary rules. We do our best to give our advertisers what they want—work overtime if necessary—but each advertising form has to be on the press at a specified time. That is why we cannot guarantee proof or location unless we have copy on time. We want our advertising space to work at maximum efficiency for our advertisers.

The Paper is dated and mailed Saturday

Electric Railway Journal, 239 W. 39th St., New York

Why Baldwin Trucks Excel



Baldwin Truck, class 84-30-AA
Built for Dayton & Troy Electric Ry. Co.

Consider the importance of the truck equipment on an electric car which runs at speeds of sixty miles per hour and over.

Then consider the exceptional qualifications, for building such trucks, of a company which has had 85 years' experience in constructing all types of railway motive power.

The trucks of a high speed electric car must be built with just as much intelligence and care as a fast passenger locomotive.

That is the way Baldwin trucks are built.

That is why they excel.

THE BALDWIN LOCOMOTIVE WORKS

Philadelphia, Pa.

REPRESENTED BY

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C. H. Peterson, 1210 Boatmen's Bank Bldg., St. Louis, Mo.
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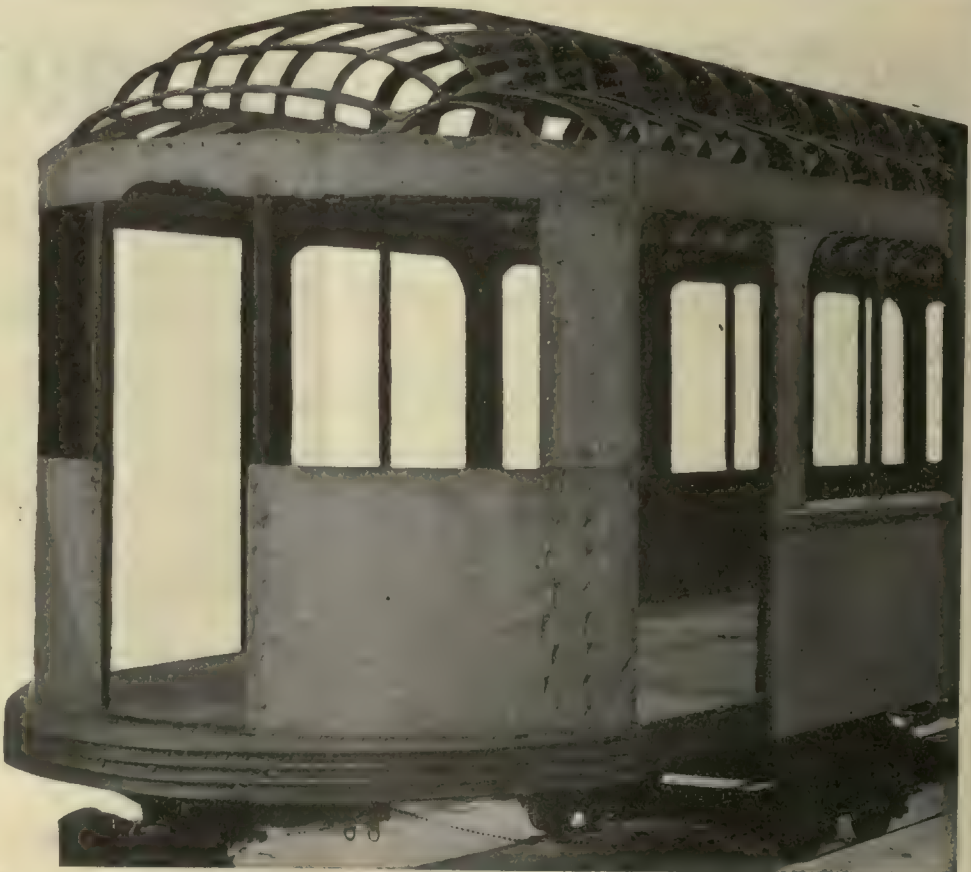
Jewett Steel Cars



Represent highest class workmanship from a thoroughly modern plant.

Let us figure on your new equipment.

The Jewett Car Company
Newark, Ohio

3263

Permanent Overhead Construction

If you find it necessary to rebuild your interurban overhead construction on account of the decay of your wooden poles, write us and we will give you an estimate as to what permanent reconstruction would cost you.

Archbold-Brady Company
Engineers and Contractors
Syracuse, N. Y.

STEEL POLES For every pole purpose

Bates Steel Poles in use by the DES MOINES CITY RAILWAY, Des Moines, Iowa, U. S. A.

Strongest STEEL POLE of like weight in the world.
Best STEEL POLE in the world for electric railway trolley service.
Most artistic STEEL POLE in the world for any service.
We make the lowest prices.
We have constantly on hand about two thousand tons of steel and can make immediate shipments.
A full line of convenient malleable fittings.
Our steel pole TREATISE tells a big story, ask for it.

BATES EXPANDED STEEL TRUSS CO.
208 South La Salle St., Chicago, Ill., U. S. A.

An Assurance of Uninterrupted Service

is best secured by a careful selection of the transmission line insulators. It is here that breakdowns are most likely to occur.

Hemingray Insulators

by reason of their continued use on important transmission lines have demonstrated the soundness of Hemingray design. The teats on the petticoat attract water on the outer and inner surfaces into drops—preventing the creeping of moisture on insulators and pins. The line is complete and the catalog shows it. Have you a copy?

Hemingray Glass Company
Established 1848 *Incorporated* 1870 } *Covington, Ky.*
Factories: MUNCIE, INDIANA

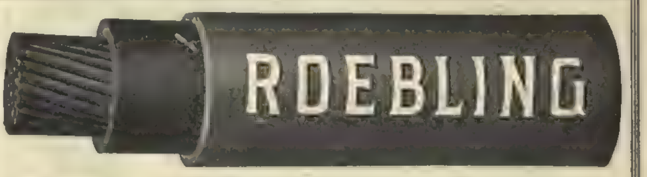
No. 72—10000 Volts

No. 20—5000 Volts

ALUMINUM
Railway Feeders
And all kinds of Electrical Conductors

Aluminum feeders are less than one-half the weight of copper feeders and are of equal conductivity and strength. If insulated wire or cable is required, high-grade insulation is guaranteed. Write for prices and full information.

Aluminum Company of America
Pittsburgh, Pa.



ELECTRICAL WIRES and CABLES OF EVERY DESCRIPTION

Aerial Cables
Annunciator Wire
Automobile Horn Cord
Automobile Lighting Cables
Automobile Starter Cables
Automobile Charging Cables
Automobile Ignition Cables
Armature Coils
Bare Copper Wire
Bare Copper Strands
Copper Wire Bare
Cambric Cables
Fixture Wire
Fire and Weatherproof Wire
Field Coils
Lamp Cord
Moving Picture Cord
Mining Machine Cables
Magnet Wire
Power Cable, Rubber Insulated
Power Cable, Cambric Insulated
Power Cable, Paper Insulated
Slow Burning Wire
Telephone Cable, Paper Insulation
Telephone Cable, Rubber Insulation
Weatherproof Wire

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THE LINDSLEY BROTHERS CO.
Western "Good Poles Quick" Northern
Quick Shipments from our Minneapolis Yard
Rooms 832-834, 72 West Adams St., Chicago, Ill.
Spokane - St. Louis
Butt Treating Open Tank and "Hot and Cold" Processes

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POLES, CROSS ARMS, TIES, TIMBERS, PAVING BLOCKS.
CAPACITY 100,000,000 FEET B. M PER ANNUM
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INTERNATIONAL CREOSOTING & CONSTRUCTION CO.
Address all communications to Office, Galveston, Texas
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The Celebrated
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J. R. McCARDELL & CO.
Patentees and Sole Manufacturers
TRENTON, N. J.
Correspondence Solicited
It meets every requirement.

Barrett's B Carbosota Grade-One Liquid Creosote Oil
CUTS WOOD PRESERVING BILLS IN HALF
Write for booklet
The Barrett Company
NEW YORK
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We are Direct Producers and Can Save You the Jobber's Profit
BELL LUMBER COMPANY
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Prolong the Life of Poles—
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costs little – easy to apply
Write for Sample to test
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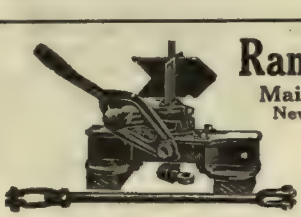

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New York Office: 30 Church St.
Automatic Switch Stands,
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Crossings, Switches, Etc.

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We brag about the SERVICE we give
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Automatic Signals
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TOOLS
for all classes of electrical construction and repair work. Write for catalog.
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ALBANY, N. Y.
CONSULT OUR ENGINEERS ON YOUR SIGNAL REQUIREMENTS
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Railroad and Tram Car Specialties
New inventions developed, perfected and worked for the English market
Messrs. G. D. Peters & Co., Ltd.
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EVERY DAY A BLASTING DAY

WHEN BLASTERS LOAD

DU PONT

Red Cross
Low Freezing Powders

Every contractor realizes the importance of using explosives insensitive to frost.

Red Cross Powders rarely freeze and can be loaded and fired with satisfactory results in cold weather.

Safeguard your blasting crew, minimize your contractors' risk and extend your outdoor working season by blasting with Red Cross Low Freezing Powders.

Tell us what your blasting work is and let our expert field men suggest economic and practical methods.

E. I. du Pont de Nemours & Co.
Powder Makers since 1802
Wilmington, Delaware

Duquesne Light Co. Laying 11,000-volt Sub-Marine Cables, Made by Standard Underground Cable Co., Across Ohio River at Pittsburgh.

At Your Service

It is a simple phrase, yet today forms the basis of all permanent and successful business. The above installation was made in the interest of better service.

Standard Light and Power Cables

were installed because this customer had experienced their dependability, both as to materials and delivery, in many previous installations.

Standard service means not only *willingness* but also an exceptional *ability* to supply you with any quantity of electric wires and cables of all kinds and sizes, also cable accessories, etc.

A request for prices or other information will receive immediate attention. Write today.

Standard Underground Cable Co.
Pittsburgh, Pa.
New York Philadelphia Chicago
Boston San Francisco St. Louis
and other principal cities
For Canada: Standard Underground Cable Co., of Canada, Limited, Hamilton, Ont.

Nachod Bell on Nashville Interurban Railway

Nachod Signal Co., Inc.
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FREE

—a handbook on economical connections — and a sample Frankel Solderless Connector.

MAKERS OF THE BEST ONLY
FRANKEL
CONNECTOR CO. INC. N.Y.

Factory:
177-179 Hudson St.,
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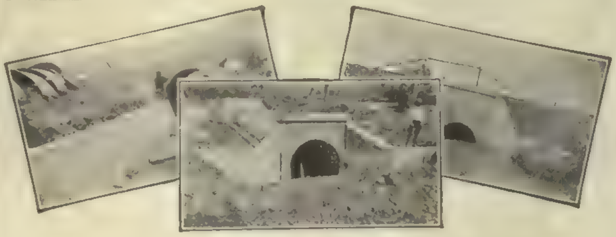
733-735 Broadway

The man on your road responsible for economical and proper electrical connections will appreciate the story that this book and sample connector will tell.

Both represent new ideas—both point the way to better splices.

You incur no obligation in writing for them. Do it now.

You can get these Results, too!



Using "ACMES" on an extensive ditch job in Montana

You know the **ACME** well
—or should

If not, send for our big 56-page illustrated Catalog.

Made in Flat Corrugated Bottom (half cylindrical) as well as Full Cylindrical Sections and of pure galvanized iron—(NO-CO-RO METAL)—they are more broadly and economically adaptable for *many* projects than you might at first think.

"ACMES" have been *good* for years; they are *better* today. Shall we prove it?

Shipped Set-up where preferred.

THE CANTON CULVERT & SILO CO.
MANUFACTURERS
CANTON, OHIO, U.S.A.

AWARDED GRAND PRIZE PANAMA PACIFIC INTERNATIONAL EXPOSITION

American Rail Bonds

Crown
United States
Twin Terminal
Soldered

American Steel & Wire Company
Chicago New York Cleveland Pittsburgh Worcester Denver
Export Representative: U. S. Steel Products Co., New York
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HIGHEST QUALITY
TRACK SPECIAL WORK

HIGHEST QUALITY SAFETY DURABILITY
C F & C Co

WE MAKE THIS GRADE ONLY

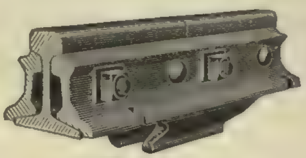
CLEVELAND FROG & CROSSING CO.
CLEVELAND, OHIO

New York Switch and Crossing Co.
Hoboken, N. J.

Special Track Work

Manganese Steel and Hard Center Frogs
Switches Mates Crossings

The Rail Joint Company
61 Broadway, New York City



100% Rail Joint

Makers of Continuous, Weber, Wolhaupter and 100% Rail Joints
Standard—Insulated—Step—Frog and Switch
Protected by Patents
Grand Prize, San Francisco, 1915 4

Kilby Frog & Switch Co.
BIRMINGHAM, ALA.

Tongue Switches, Mates, Frogs, Curves and Special Work of all kinds for Street Railways.

SPECIAL TRACK WORK
For ELECTRIC RAILWAYS
THE AMERICAN FROG AND SWITCH CO.
HAMILTON, OHIO

Continuous Operation of the Power Plant

is a matter of extreme importance to the electric railway man. There must be no failure to supply the current when it is needed.

The constant use of Dearborn Treatment guarantees a high percentage of efficiency from the boilers. Made to suit the water conditions shown by analysis, it keeps the boilers free from scale, so that they steam freely and quickly, all corrosive or pitting action of the water is arrested, and, in fact, the boilers are in condition to yield their full quota of power constantly, while the fuel consumption is greatly reduced.

Send gallon of water for analysis, and let us advise regarding your plant requirements.

Dearborn Chemical Company
McCormick Building, Chicago

SKIP HOIST FOR ASHES

Cheapest to install, operate and maintain.

Not affected by heat, grit or water.

Large capacity—High lift—Low power consumption.

Can be operated by a common laborer.

Simplest device built. One pull on the rope causes the bucket to ascend, discharge and return automatically.

Write for prices on this device, also for catalog No. 20 showing all modern coal and ash handling systems.

R. H. BEAUMONT CO.
111 So. 5th St., PHILADELPHIA

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WATER TUBE STEAM BOILERS

Steam Superheaters Mechanical Stokers

Works BARBERTON, OHIO—BAYONNE, N. J.

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Greatly Increase Efficiency and Power of Steam Turbines.
POWER SPECIALTY CO.
Trinity Building, 111 Broadway
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The MODERN WAY of handling ASHES:
GECO Pneumatic Ashhandling Systems
GECO Steam Jet Ash Conveyors

GECO PATENTED APPLIANCES

GREEN ENGINEERING CO.
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Catalogue 8—GECO Pneumatic Ash Handling Systems.
Bulletin 1—Green Chain Grate Stokers.
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FOR BOILER FEED AND ALL INDUSTRIAL USES
WM. B. SCAIFE & SONS CO. PITTSBURGH, PA.

SAFETY
For Protection Always
But we have made
TURBOIL
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The most popular
POWER-HOUSE
WORDS
because they carry
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Circuit Breakers
Best in
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For
Heavy Railway Service
Write for Hand Book of the I-T-E Circuit Breaker which contains Circuit Breaker data for every Service
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Steel and Wood
Rolling Doors
For Car Houses and Power Houses
Write for new Catalog "M" and Booklet
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STERLING
Insulating Varnishes
and Compounds
HIGHEST GRADE STANDARD OF QUALITY
Clear and Black Air Drying Insulating Varnishes
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FOR THE MANUFACTURER—OPERATOR—REPAIRER
Inquiries invited. Catalogue on request.
We gladly assist in selection.
THE STERLING VARNISH COMPANY
PITTSBURGH, PENNA.
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Murphy
AUTOMATIC
Furnace
232
CONSERVES energy and triples the steaming capacity of your boilers. Write for Catalog "C."
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of
Quality
STANDARD
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For All Electrical Service Use P & B Varnishes, Insulating Compound, and Weatherproof Insulating Tape

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Ohmlac is a preservative against RUST, moisture, acids, alkalies, sulphur and electrolysis.

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such as field coils, armatures, wires, cables, transformers, batteries, etc., and

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Cameron Commutators Command Confidence. Why?

Because of the dense, high conductivity hard-drawn copper we put into the bars,
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Because of years of specialized, commutator-building experience that makes our workmen experts in their line,
Because of the Cameron ideal of quality—and the painstaking inspection that guarantees it in every job we turn out.
Specify CAMERON for commutators, segments or coils.

Cameron Electrical Mfg. Co.
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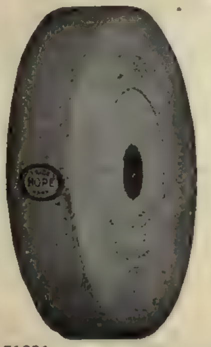

No matter what kind of electrical tape or webbing you need, we make it — in all weights, widths and textures. Get the Hope Sample Book and solve your webbing problems.

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Built by

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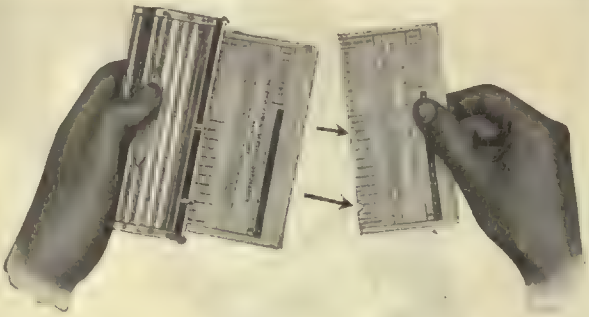

"Lead me not into Temptation"

is the plea of the honest conductor. Answer that plea by doing away with the tempting *open* system of fare collection.

Answer it to your everlasting credit and profit by using for interurban and suburban fare collections the

Macdonald Ticket Box

the box that closes the audit stub to the conductor. It gives no check to the conductor on the amount he is expected to turn in. It helps the honest conductor and shows up the dishonest one.

Sample sent on request.

The Macdonald Ticket & Ticket Box Co.
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Full Power with High or Lower Adjustment

Many emergencies requiring a powerful jack present a difficulty in bringing the jack to bear on the load. The

Buckeye Emergency Jack No. 239 Special

saves time, strength and trouble. The many positions to which it is adjustable easily solve perplexing lifting problems. Full details in our catalog. Write for it.

The Buckeye Jack Mfg. Co.
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3

The Acetylene Blow Torch

Prest-O-Torch

Quicker and cheaper than a gasoline blow-torch for brazing and soldering

For factories, repair shops, linemen, dentists, jewelers, the Prest-O-Torch saves time and money. Used with Prest-O-Lite Tanks—ready made gas. Intense, concentrated flame instantly lighted. No depreciation, safe and convenient. Style "A," price, 75c (Canada, 85c) will braze up to ⅜ inch round rod. Style "C" for heavier work, $2.25 (Canada, $2.75). Special styles for dentists. Write for literature or send order now. Money refunded if not satisfied.

The Prest-O-Lite Co., Inc. 805 Speedway Indianapolis, Ind.
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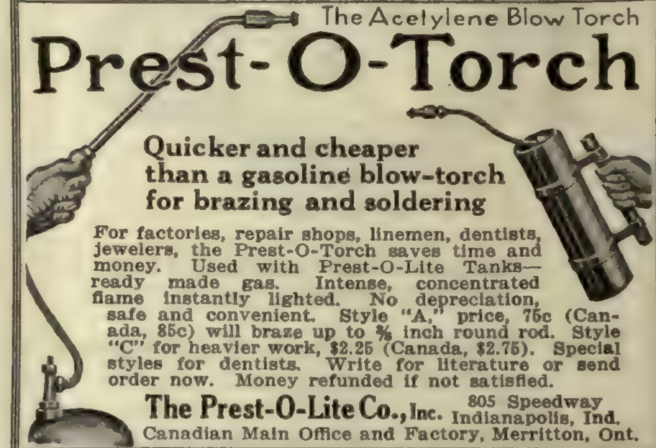

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AMERICAN RAILWAY SUPPLY CO., 134-136 Charles St., NEW YORK

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Tapes and Webbings

are produced according to the specifications laid down by Railway Motor Manufacturers. Popular with manufacturers of motors because always right as to width and thickness of material, breaking strength, yarns, warp ends, and other standard requirements. The prices and material invariably satisfactory.

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Representatives: Chicago—E. P. Bartlett, 1368 Grand Ave. St. Louis—Brown & Hall, 620 Central Nat. Bk. Bldg. Cleveland, Ohio—R. S Mueller, 423 High Ave., S. E.

JACKS

Barrett Track and Car Jacks
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Commutators Refilled
Prompt Service

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HALE & KILBURN
No 199-AE Seat

One of our most popular interurban types. Its handsome outlines, hardwood capping for armrest, pressed steel framework, and "Walkover" mechanism make it one of the handsomest and most durable seats for interurban service. Furnished in any upholstery desired, with or without footrest.

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Hale and Kilburn Co.

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Assure

Perfect Circulation

of the heated air in the car. The patented circulating air-space at the back allows a constant stream of heated air to pass out into the car. Besides affording maximum circulating efficiency, this patented construction assures long life by keeping all parts at normal temperature.

70,000 of the 90,000 cars in the United States are warmed by Consolidated heaters.

Write for descriptive bulletins.

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Our forty years of successful punch making are well demonstrated in the perfection of our product, which is Standard throughout the world.

These punches prove the most efficient, because they operate quickest and easiest, and the most economical because they wear longest.

Let us show you WHY.

Punchmakers since '72.

R. Woodman Mfg. & Supply Co.

82 Sudbury St., Boston, Mass.

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Eastern Electrical and Export Representatives.

WE CAN CUT YOUR COST OF HEATING CURRENT

WRITE FOR THERMOSTATIC CONTROL INFORMATION

GOLD

- **ELECTRIC HEATERS** Cut Installation and Maintenance Charge.
- **VENTILATORS** Also Ventilate in Stormy Weather.
- **THERMOSTATS** Save Current.
- **ORIGINATED** the use of **NON-CORROSIVE** Wire for Electric Car Heaters.
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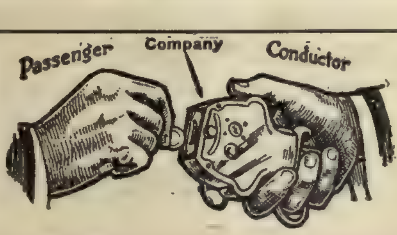
LET US FIGURE ON YOUR NEXT REQUIREMENTS

Gold Car Heating & Lighting Co., 17 Battery Pl., New York



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By the
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Ventilation—Sanitation—Economy—Safety

All Combined in

THE COOPER FORCED VENTILATION HOT AIR HEATER

Patented September 30, 1913. Ask for the full story.

We Also Manufacture Pressed Steel Hot Water Heaters

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Sole Manufacturers

"Honeycomb" and "Round Jet" Ventilators

for Monitor and Arch Roof Cars, and all classes of buildings; also

Electric Thermometer Control

of Car Temperatures.

721 W. FULTON ST. *Write for* **1328 BROADWAY**
Chicago, Ill. *Catalogue* **New York, N.Y.**

THE RAILWAY SUPPLY & CURTAIN CO.

CHICAGO

CAR CURTAINS & FIXTURES
FOR ALL PURPOSES

CATALOGUE ON REQUEST

RS&C
MAKE THE BEST

4 to 6-In. Dia. ½ to ⅝-In. Wheel Axle

Do Your Winter Shopping Early

Do not wait for the first sleet storm to catch you unprepared. Order **Nuttall Sleet Wheels and Scrapers** now. Shipments from stock on orders placed now but we cannot guarantee them later.

Nuttall, Pittsburgh

Johnson Registering Fare Boxes

used in connection with the car register increase receipts $1.00 per car, per day, counts metal tickets the same as cash thus giving a positive check on all class of fares.

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Cleveland Fare Boxes

Cleveland Fare Box Co.
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The National Standard for Car Curtains and Car Upholstery

AGASOTE HEADLINING

The only headlining made in one solid piece. Will not separate, warp or blister. Waterproof and homogeneous.

The Pantasote Company

11 Broadway, New York
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797 Monadnock Bldg., San Francisco, Cal.

The Best Shade Rollers for Cars

SPECIAL shade rollers for cars, that will last and give satisfaction for years, and yet cost but little more than the poorest you can buy, are made by the Stewart Hartshorn Co., E. Newark, N. J. This company is by far the largest shade roller manufacturer in the world. It is able to give high quality at lower prices because of the enormous output. Write for catalog, stating wants. You are always protected when you buy shade rollers if they bear the signature Stewart Hartshorn

Samson Bell and Register Cord

Solid braided cotton, extra quality. All sizes and colors. More durable, more economical and better looking than leather or rawhide. Send for samples and full information.

SAMSON CORDAGE WORKS **BOSTON MASS.** 2

Have you our new

Trolley Wheel Bulletin

Write for your copy

The Eureka Company North East, Pa.

MASON SAFETY TREADS—prevent slipping and thus obviate damage suits.

KARBOLITH CAR FLOORING—for steel cars is sanitary, fireproof and light in weight.

STANWOOD STEPS—are non-slipping and self-cleaning.

Above products are used on all leading Railroads. For details address

AMERICAN MASON SAFETY TREAD CO.

Main Offices: Lowell, Mass.

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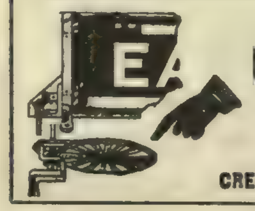

See the Crank of the

CREAGHEAD DESTINATION SIGN

By means of it, conductor or motorman can change sign without leaving platform. All that has to be done is to turn the crank. Better investigate.

CREAGHEAD ENGINEERING CO., CINCINNATI, O.

ELECTRIC RAILWAY DEVICES

Rectifier for Frozen Air Pipes.
High Power Compact Hand Brakes, Gear or Differential Types.
Sterling Light Weight Roller Bearing Trolley Bases.
Screenless Air Cleaners for Compressors
Sterling Sand Boxes.
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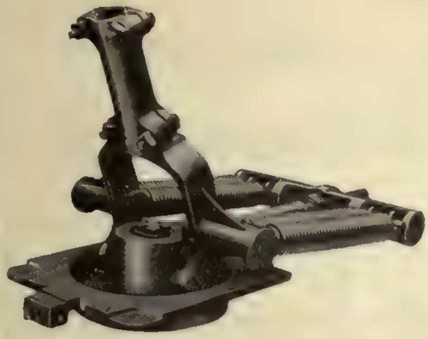
Trigger Lock Reversible Controller Fingers.
"Q-P" Trolley Catchers.
Soldered Rail Bonds.
Friction and Insulating Tapes.
Sterling Ticket Punches.
Controller Handles.

LORD MFG. CO.,
105 W. 40th St., New York



Simplex No. 2 Base

is only 3 inches high, yet gives 32 lb. tension at normal height and 40 lbs. at crossings.

The slightest pull on the trolley rope will revolve it. Tension decreases as pole comes down—increases as pole goes up.

All working parts—center pin, rollers and bushing—are of case-hardened vanadium steel.

Get Our 60-day Free Trial Offer

The Trolley Supply Co., Canton, Ohio

INSURANCE AGAINST SNOW BLOCKADES

A blockade means loss of revenue. You can avoid this loss by having your cars equipped with ROOT SPRING SCRAPERS. They begin working when the snow begins falling and make it possible to maintain your schedule even during heavy snow storms. Scraper No. 6 (shown below) is especially well adapted to handle a heavy snow fall. It is replacing sweepers on many lines.

Send to-day for our Catalog

ROOT Spring Scraper

Root Spring Scraper Company,
Kalamazoo, Michigan

TULC

We base all our "ads" on facts. We guarantee TULC and stand back of it. Others have shown a large saving with TULC. It has been proven to be the best lubricant.

THE UNIVERSAL LUBRICATING CO.
Schofield Building CLEVELAND, O.

When writing to Advertisers in this publication you will confer a favor on both publisher and advertiser by mentioning the

Electric Railway Journal

VAN DORN COUPLERS

are made for every condition and requirement. M. C. B. Pin and Link, Car and Air, in all sizes and types.

VAN DORN COUPLER CO.
2325 So. Pauling St., Chicago, Ill.

Sleet Scrapers

We are rapidly approaching the season that is the operating man's worst enemy. To insure continuity of Service—to keep the wheels moving—

Nuttall Sleet Scrapers

should be on every car. Their cost is small —but they are mighty valuable when needed. We have a big stock of Nuttall Sleet Scrapers on hand now—we're ready to make quick shipment.

UNION ELECTRIC COMPANY
Terminal Warehouses Pittsburgh, Pa.

ENCLOSED FUSES A fuse is a small article when compared with the apparatus it protects, but on its performance depends the safety of this apparatus. The importance of reliable fuses is evident. "Union" fuses will give you good service.

NEW "UNION" CATALOG We have just issued our No. 28 catalog, which combines the former Fuse and Box catalogs. It contains much valuable reference information, also complete descriptions of fuses for railway service.

Write for a copy.

CHICAGO FUSE MFG. CO.
CHICAGO NEW YORK

15%
Energy Reduction
Is but One Saving

Rollway Bearings accomplish. Not only do they eliminate friction in truck bearings to permit more coasting, but they save enough on lubrication and carhouse labor to make the change a good investment.

Write for the facts to

The Railway
Roller Bearing Co.
Syracuse, N. Y.

TRADE DAUM MARK

Renewable Fuses

Really renewable. Not the kind that waste more time filling than new fuses are worth. but the kind that save 60 to 80 per cent on cost of non-renewable cartridge fuses. The right kind.

Send for sample and literature.

A. F. DAUM
Sole Manufacturers, Pittsburgh, Pa.
Makers of the First Successful Refillable Fuse on the Market.
Members Society for Electrical Development

Ask us
WHY they
wear longer
THE AJAX METAL CO.
PHILADELPHIA & BIRMINGHAM ALA.
BRANCH OFFICES IN PRINCIPAL CITIES
AJAX
CAR BRASSES

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OFFERS A MEETING PLACE FOR

Buyer and Seller
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Salesmen and Those Wanting Agents
Manufacturers Looking for Work and Others Having Work to be Done

GET YOUR WANTS INTO THE SEARCHLIGHT

The "Hycap-Exide" Battery
for
STORAGE BATTERY STREET CARS
THE ELECTRIC STORAGE BATTERY CO
PHILADELPHIA

S-W Shim Slack Adjusters Save Brakeshoes and Labor

SMITH-WARD BRAKE COMPANY, Inc.
17 Battery Place, New York

W. R. Kerschner Co., Inc.
Eastern Sales Agents
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Service

You get more than simply BRAKE SHOES when you use our Product.

You get the advantage of our constant effort to improve our product for your service.

You get the earnest co-operation of our engineers to assist you in getting the full quota of service from each Brake Shoe applied.

Miles of service from the Brake Shoe are more to be desired than pounds of scrap.

All of which means increased efficiency and decreased cost of Brake Maintenance.

American Brake Shoe & Foundry Co.
30 Church St., New York
McCormick Bldg., Chicago **Chattanooga, Tenn.**

THE
CINCINNATI
CAR
COMPANY

WORKS:

WINTON PLACE
CINCINNATI, OHIO

UNION SPRING & MFG. CO.

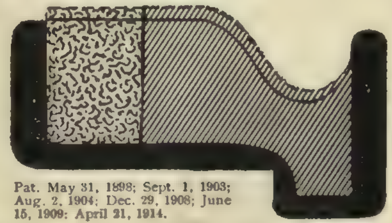
SPRINGS
COIL AND ELLIPTIC

M. C. B. Pressed Steel Journal Box Lids

General Office: First Nat'l Bank Bldg.
PITTSBURGH, PA.
Works: New Kensington, Pa.

50 Church St., New York. 1204 Fisher Bldg., Chicago, Ill.
Missouri Trust Bldg., St. Louis, Mo.

Wheel Condition No. 6



Pat. May 31, 1898; Sept. 1, 1903; Aug. 2, 1904; Dec. 29, 1908; June 15, 1909; April 21, 1914.

When only the outer part of tread needs grinding this arrangement of abrasive and non-abrasive material in the Wheel Truing Brake Shoe will correct matters—and without the car losing a minute's service.

Wheel Truing Brake Shoe Co.
Detroit **Michigan**

E. G. Long Company

EDWARD H. MAYS, President
Offices, 50 Church Street, New York

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Peckham Truck Parts
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Car and Truck Accessories

ELECTRICAL REPRESENTATIVES
Union Spring & Mfg. Co.
Leaf and Coil Springs
MCB Pressed Steel Journal Box Covers

SEARCHLIGHT SECTION

ARCHER & BALDWIN

114-118 Liberty Street New York City
TELEPHONE 4337-4338 RECTOR

Rotary Converters, 25 Cycle

2—150 KW. General Electric type T. C., 4-150-750, 25 cycle, 3 phase, 575 volt, rotary converters, 750 r.p.m., complete with end play and speed limit device.

Rotary Converters, 60 Cycle

2—150 KW. Westinghouse 3 phase, 60 cycle rotary converters, 550 volts, 273 amps., 720 r.p.m., complete with 4—100 KW. Westinghouse Scott connected oil insulated transformers, 10,000/9500 volts prim., 430/362 volts secy.

Above will be sold with or without transformers.

Railway Motors

2—75 to 90 HP. Westinghouse No. 112 Railway Motors, newly rewound, practically new.

IMMEDIATE DELIVERY

An Unusual Opportunity

Just purchased the entire equipment of the Elkins Electric Railway Co., Elkins, W. Va., consisting of 9 miles of 75 and 80 lb. rail, same amount of 4-0 copper wire, poles, ties, bridges, bonds for the rail, spikes, bolts, frogs and switches, cross irons, cross overs, electric power plant, voltage 550 d.c. 5 passenger cars, 2 work cars, and 2 freight cars. Everything complete, and ready to operate.

Will make very attractive prices on this material to move quickly. Please wire if interested.

M. K. FRANK
Frick Bldg., Pittsburgh, Pa.
or L. K. HIRSCH
Randolph Hotel, Elkins, W. Va.

MACGOVERN AND COMPANY
INC.

FRANK MACGOVERN, Pres. & Gen. Mgr.
114 LIBERTY STREET NEW YORK CITY
'Phone, 3375-3376 Rector

60 CYCLE ROTARY CONVERTERS

1 1000 KW. Gen. Elec., type HC, form P, 6 phase, 1667 amps., 600 volts D.C., 360 R.P.M.
2 300 KW. Gen. Elec., type HC, form P, 6 phase, 500 amps. 550 volts D.C., 900 R.P.M., with end play and speed limit device.
1 200 KW. Westinghouse, 3 phase, 600 volts D.C., 900 R.P.M., with starting motor.

550 VOLT DIRECT CURRENT UNIT

300 KW. Westinghouse, 550 volt, 145 R.P.M., dir. conn. to 16½" and 30½" x 30" Buckeye tandem engine.

Immediate Delivery

THIS IS OF NECESSITY ONLY A PARTIAL LIST—SEND FOR CATALOG

CARS FOR SALE

OPEN and CLOSED
MOTOR and TRAIL
Write for Price and Full Particulars to
ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

COMPLETE ARMATURES FOR SALE
FOR ALL THE STANDARD STREET RAILWAY MOTORS
GET OUR PRICE WE CAN SAVE YOU MONEY
America's Greatest Repair Works
CLEVELAND ARMATURE WORKS, Cleveland, O.

Big Results from Little Ads

The advertisements in the Searchlight Section are constantly bringing together those who buy and sell, rent and lease or exchange. They convert idle commodities into useful cash, idle cash into useful commodities, and that which you have but don't want into that which you want but don't have. The cost is a trifle, the results considerable.

Get your Wants into the Searchlight

Get your Wants into the Searchlight

ADVERTISING RATES

Under "Positions Wanted," including Salesmen looking for new connections, Evening Work Wanted, Side Line Wanted, etc., undisplayed advertisements cost **two cents a word**, minimum charge 50 cents an insertion, **payable in advance.**

Under "Positions Vacant," including Agents and Agencies Wanted, Representatives Wanted, Salesmen Wanted, Partners Wanted, Desk Room Wanted or For Rent, Business Opportunities, Employment Agencies, and Miscellaneous For Sale, For Rent, and Want ads; also Auction Notices, Receivers' Sales, Machinery and Plants For Sale or Wanted (with one line of display heading), undisplayed advertisements cost **three cents a word**, minimum charge $1.50 an insertion.

If replies are in care of any of our offices, allow five words for the address.

All advertisements for bids (Proposals) cost $2.40 an inch.

ADVERTISEMENTS IN DISPLAY TYPE

cost as follows for single insertions:

1/16 p. (1⅛x3⅜ ins.)	$5.00	1 in. (1x2 3/16 ins.)	$3.00
⅛ p. (2⅝x3⅜ ins.)	10.00	4 inches (4x2 3/16 ins.)	11.60
¼ p. (5x3⅜ or 2⅝x7 ins.)	20.00	8 inches (8x2 3/16 ins.)	22.40
½ p. (10¼x3⅜ or 5x7 ins.)	40.00	15 inches	40.50

1 page (10¼x7 ins.) 30 inches....$80.00

For space to be used within one year, to be divided to suit requirements of advertiser, provided some space is used in each issue following first insertion:

1 page	$80 a page	18 pages	$56 a page
3 pages	72 a page	26 pages	53 a page
6 pages	64 a page	40 pages	52 a page
12 pages	58 a page	52 pages	50 a page

In replying to advertisements, do NOT enclose original testimonials, drawings or photographs that you may want returned. Advertisements for men often produce several hundred applications and no employer can be expected to read all of these carefully and return the papers or applications of those in which he is not interested. State your experience and qualifications in as concise and neat a manner as possible and enclose COPIES of your testimonials.

When advertising machinery, use your own name and address—or a local address of some kind—so that the readers can wire direct and get quick replies. We advise also that you state in your advertisement the present location of plant that is offered for sale, or point of delivery provided you are in the market for equipment.

FOR SALE

A Metal Opportunity

Take advantage of the high prices of metal. We are cash buyers of all grades of scrap metal. Our specialty is buying electric plants, storage battery plants, storage battery plates and sediment. We buy small lots as well as large lots. Write us and tell us what you have and we will be pleased to quote you prices. National Metal & Rubber Co., 30-31 India Wharf, Boston, Mass.

Snow Plow for Sale

Single track, detachable iron snow plow; never been placed in service; photograph and full description on application. This plow capable of handling heavy drifts and is of first class construction throughout. The Trinidad Electric Transmission Railway & Gas Company, Trinidad, Colo.

RAILS

1500 tons 60 lb. Good
600 tons 56 lb. Good
500 tons 40 lb. New
600 tons 30 lb. Good
300 tons 25 lb. Good

Or any Section—New or Relay

Before buying
LOCOS., CARS, EQUIPMENT, MACHINERY, TANKS
See what Bargains can be obtained from
ZELNICKER IN ST. LOUIS
423 First Nat. Bk., Chicago
910 Hennen Bldg., New Orleans

Armature Coil Taping Machine

Saves Time, Labor and Money

A boy can tape 40 coils for Westinghouse 12A Armature in an hour. Further particulars gladly furnished.

Geo. M. Griswold Machine Co.
New Haven, Conn.

MISCELLANEOUS WANTS

Motors Wanted

We are in the market for several A.C. and D.C. motors, and also some plating dynamos, any size or make. Write us what you have to offer. Schwartz & Land, 207 Centre St., New York City.

BUSINESS OPPORTUNITIES

Corporation Requires Financing

Public utility corporation requires financing. Opening for a man, firm or banking concern with knowledge of handling securities of power, light, traction and freight properties and engineering reports. Must control capital and be ready to assume active interest in the company. Full particulars to *principals only*. References required. Box 1233, Elec. Ry. Jour., 935 Real Estate Trust Bldg., Philadelphia, Pa.

POSITIONS WANTED

ACCOUNTANT, age 25, married, graduate of high school and business course, five years' experience in steam and electric railway offices, desires position as auditor receipts or traveling auditor with good prospect for advancement. Have good references. Box 948, Elec. Ry. Jour.

CIVIL engineer desires position as maintenance of way engineer. At present employed in like position and also as electrical engineer. Technical graduate, with 8 years' practical experience. Box 1234, Elec. Ry. Jour.

COMPETENT operating official open for engagement. Many years' experience high speed, single track and street railway work, also valuation reports, traffic, surveys, etc. Excellent character and ability, references. Will go anywhere; correspondence solicited. Box 1229, Elec. Ry. Jour.

POSITIONS WANTED

ELECTRIC railway executive with 12 years' experience, construction and operation, four properties, excellent references, city or interurban. Good organizer and systematizer, all departments. Short efficient methods with results, desires position; will locate anywhere. Box 1212, Elec. Ry. Jour.

GENERAL manager electric railway and lighting properties open for position. Twenty years' experience handling properties for large banking concern. Box 1236, Elec. Ry. Jour., 935 Real Estate Trust Bldg., Philadelphia, Pa.

GENERAL manager experienced in all branches of street railway business, especially legislative and preliminary work connected with development of new propositions, wishes to make change. Can get results by up-to-date methods. Best references. Box 1232, Elec. Ry. Jour.

HIGH school graduate, accounting N. Y. U. Five years' experience stores department of large Eastern street railway company. At present storekeeper of large division. Wishes to make change. Box 1239, Elec. Ry. Jour.

WANTED—position as superintendent or assistant to executive of an Electric Railway. Familiar with both city and interurban operation and have some knowledge of lighting. References present and past employers. Age 31. Box 1238, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

YOUNG man, six years in executive offices large Eastern street railway and lighting company. Now law clerk legal department. College graduate; member of bar. Can handle legal and claim work. Good assistant to busy executive. Box 1223, Elec. Ry. Jour., 935 Real Estate Trust Bldg., Philadelphia, Pa.

POSITIONS VACANT

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Get Your Wants into the Searchlight

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

More than 300 different products are here listed.

The Alphabetical Index (see eighth page following) gives the page number of each advertisement.

As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.

If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will promptly furnish the information.

Acetylene Apparatus. (See Cutting Apparatus, Oxy-Acetylene.)

Acetylene Service.
Oxweld Acetylene Co.
Prest-O-Lite Co., Inc., The.

Advertising, Street Car.
Collier, Inc., Barron G.

Air Rectifiers.
Lord Mfg. Co.

Alloys, Steel & Iron.
Titanium Alloy Mfg. Co.

Alloys, and Bearing Metals. (See Bearings and Bearing Metals.)

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Electric Service Supplies Co.
Holden & White.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

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Railway Improvement Co.

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Brill Co., The J. G.
White Co., The.

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Cincinnati Car Co.
Hadfields, Ltd.
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U. S. Metal and Mfg. Co.
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Columbia M. W. & M. I. Co.

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Electric Service Supplies Co.
International Register Co.
Woodman Mfg. & Supply Co., R.

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Coal & Iron National Bank.
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Niles-Bement-Pond Co.
Watson-Stillman Co.
Zelnicker Supply Co., W. A.

Blasting Powder & Equipment.
Du Pont De Nemours & Co., E. I.

Blow Torches for Soldering and Brazing. (See Cutting Apparatus, Oxy-Acetylene.)

Blowers.
General Electric Co.
Westinghouse Elec. & M. Co.

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Dearborn Chemical Co.

Boiler Graphite.
Dixon Crucible Co., Joseph.

Boilers.
Babcock & Wilcox Co.

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Electric Railway Improve. Co.

Bond Testers.
American Steel & Wire Co.

Bonding Apparatus.
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Prest-O-Lite Co., Inc., The.

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Electric Service Supplies Co.
Ohio Brass Co.

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Western Electric Co.
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Lincoln Bonding Co.

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Niles-Bement-Pond Co.

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Kilby Frog & Switch Co.

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Morgan Crucible Co.
Speer Carbon Co.
Westinghouse Elec. & M. Co.

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Electric Service Supplies Co.

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Beaumont Co., R. H.

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Bemis Car Truck Co.

Bushings, Fibre.
Diamond State Fibre Co.

Bushings, Graphite & Wooden.
Bound Brook Oil-less Bearing Co.

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Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.)

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc., see those Headings.)

Car Panel Safety Switches.
Krantz Mfg. Co.

Car Stop, Automatic.
Consolidated Car-Heating Co.

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Jewett Car Co.
Kuhlman Car Co., G. C.
St. Louis Car Co.
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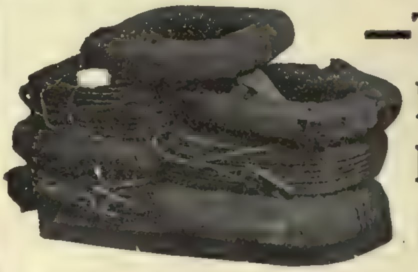

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Rockingham Road, Davenport, Iowa. Brick pavement filled with Barrett's Paving Pitch.

Barrett's PAVING PITCH

Smooth pavement with a grooved footing

THE ideal combination of a smooth pavement with a grooved footing is attained by a brick pavement with the joints filled with Barrett's Paving Pitch. The pitch in the joints makes them act like grooves. These grooves are too small to be the cause of any noise from wheels. Likewise they are too small to interfere with the smooth and easy traction which the pavement offers.

So far as noise and traction-resistance are concerned, the pavement is smooth. It has, however, the added advantage that the individual bricks surrounded by an elastic medium give a foothold for horses. The horses' hoofs find a sure grip and the load goes forward with a sure and steady pull.

In the whole 16,000 yards of this paving contract there is not a single special expansion joint. *Every joint is an expansion joint.* There will be no thrust against the rails or curbs, for every brick is surrounded with flexible pitch to take up the hot weather expansion.

Pitch gives ideal protection against water and frost. The cost is not markedly different from the less efficient cement and asphalt fillers.

Barrett's Paving Pitch will outlast the pavement. Many years from now, the pitch will be found still on duty in the joints taking up expansion or contraction and protecting the foundation against frost and water.

Booklets free on request. Address our nearest office.

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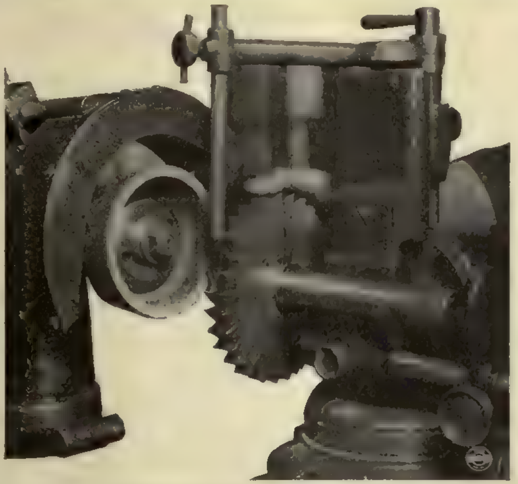

Set-up for Grinding Side Mill

Alundum in the Tool Room

One of the most popular wheels for grinding gear cutters is Alundum 3846 K, although 3850 J is a strong contender for first place. In the smaller wheels 3860 K is very satisfactory.

The wheel most commonly furnished for grinding inserted tooth milling cutters is 3846 grades J and K. Under certain conditions it has been found necessary to use a little coarser wheel, 3836 and a grade as soft as I.

Form cutters are usually ground with a saucer or dish wheel and the grain and grade in greatest demand is Alundum 3860, J and K.

It is a common fault to use a wheel that is too fine. For most classes of cutter grinding a medium coarse wheel about grain 46, never finer than 60, is best suited for both high speed and carbon steel. The finer wheels are more likely to burn the work than the coarser.

NORTON COMPANY
Worcester, Mass.

Electric Furnace Plants:

New York	Niagara Falls, N. Y.	Chicago
151 Chambers St.	Chippawa, Ont., Can.	11 N. Jefferson St.

836

Set-up for Spiral Milling Cutter

Kiboko

is a slender, limber, stinging rhinoceros-hide whip. When you go on a trip into the interior of Africa you hire your gang of baggage carriers and one of the men will be a Kiboko carrier.

If one of the burden bearers gets drowsy on the job he is inviting the stimulating influence of the Kiboko.

In other words you hire men to do a job and then have to hire a cudgel-swinger to beat the men into doing that work.

That's cheap labor for you!

It's just as preposterous as buying cheap carbon brushes and paying a man to slop lubricant on the commutator to make the brushes do a service for which you thought you paid in the first place.

You've got to pay for commutation some way. If you buy cheap brushes you've got to pay out in labor and commutator tinkering, more than you save in cost. If you buy good brushes (prescribed Morganite for instance) you pay a fair price but that's all you do pay. And you get real service without standing over them with a kiboko.

The
Morgan Crucible
Company Limited
120 Liberty St, New York City

Factory, Brooklyn, N. Y.

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Printing begins on Tuesday of each week.

Changes of copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for OK before publication.

New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.

If proofs before printing are required, change of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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Broadway, Looking North from Sixth Street—The Heavy Traffic Street of Los Angeles

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New York, November 11, 1916 McGraw Publishing Co., Inc. Vol. 48, No. 20 10c a copy

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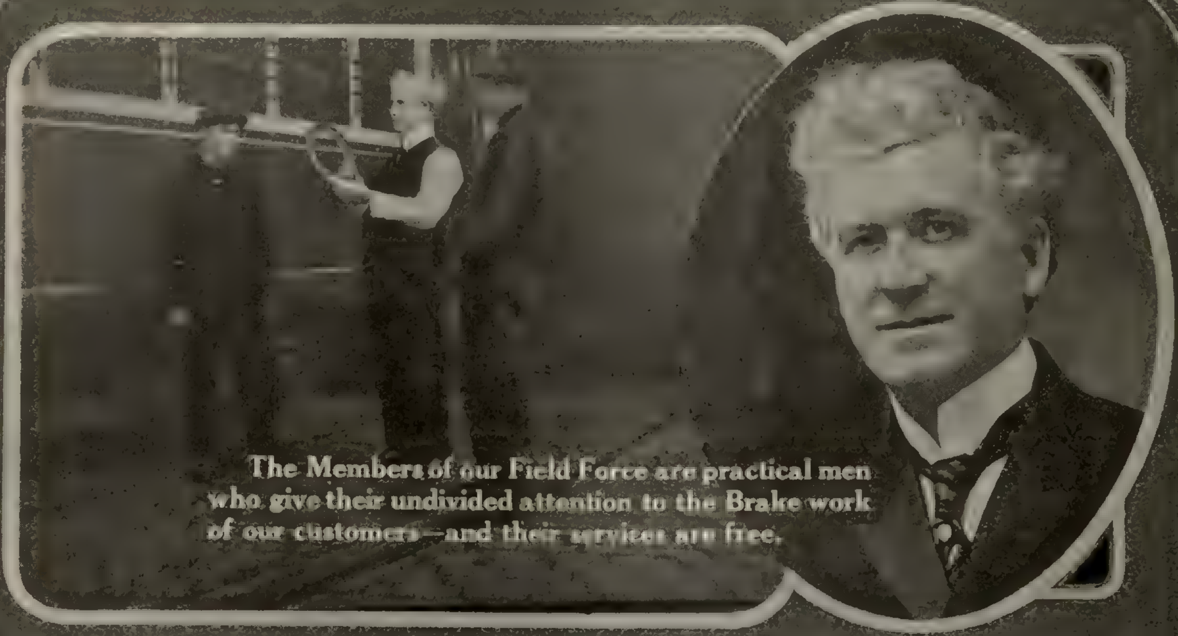

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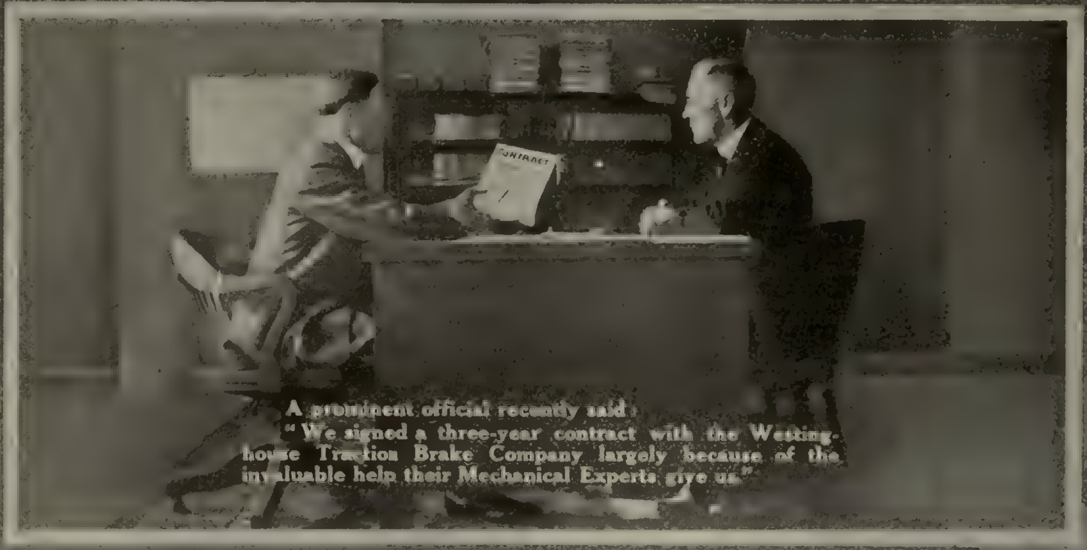

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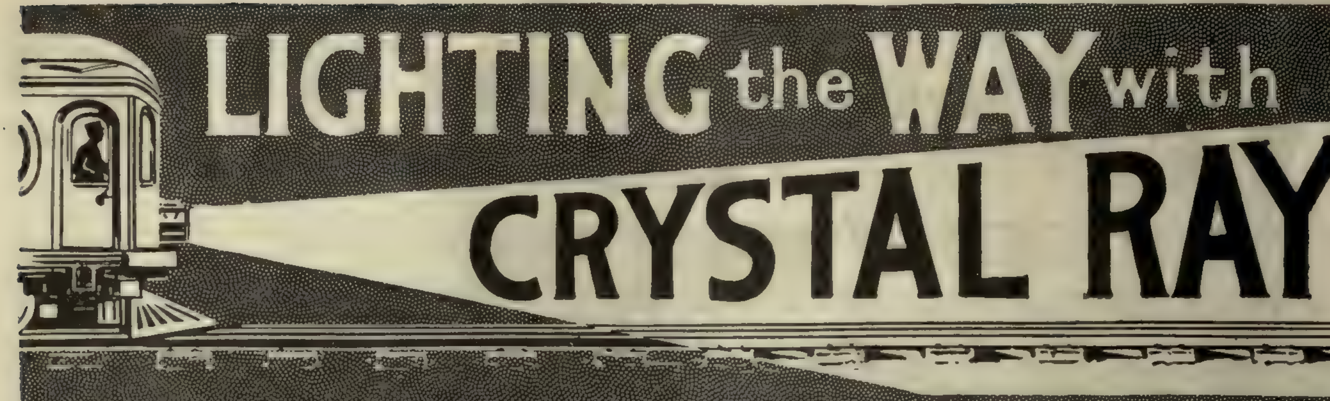

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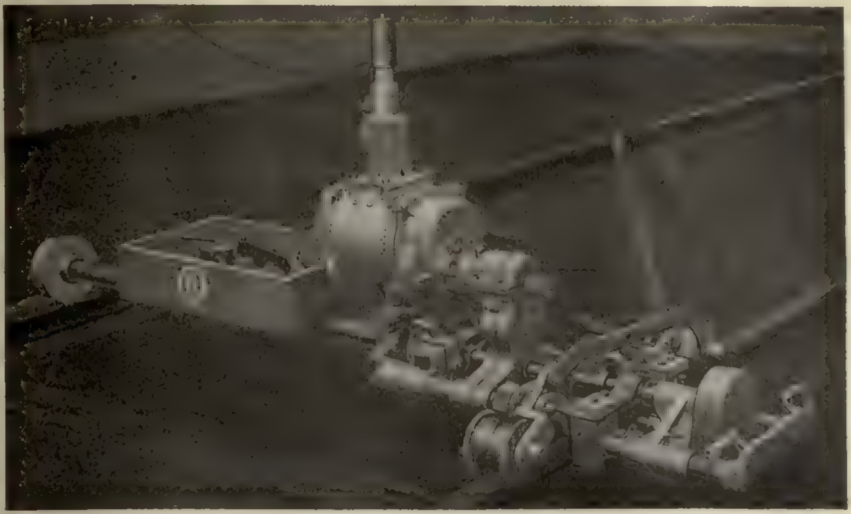

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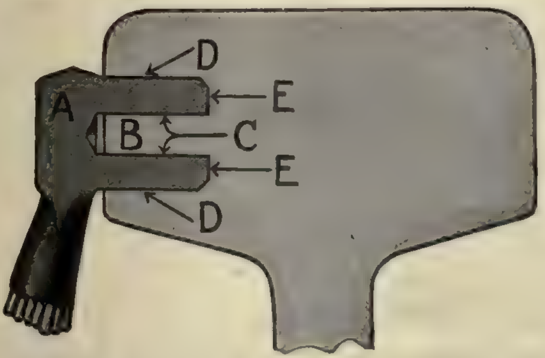

This cross-section of the Type J Bond shows how large the contact area is. The bond is forced against the rail at C, D and E.

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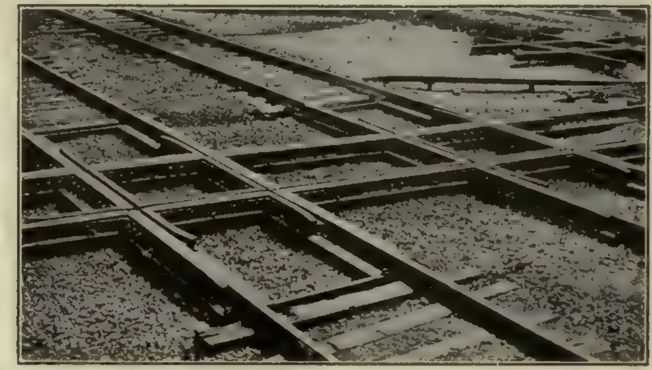

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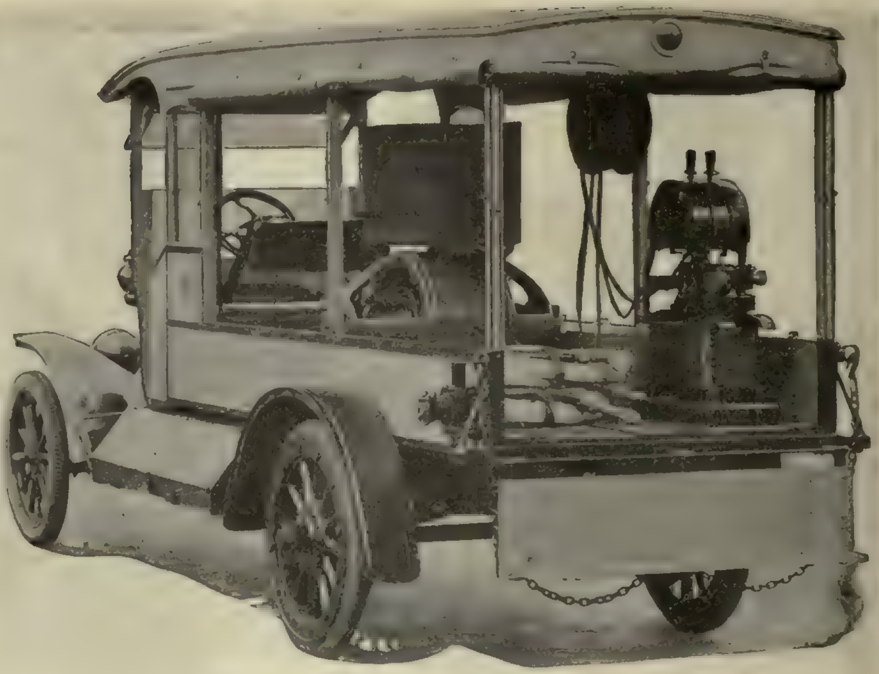

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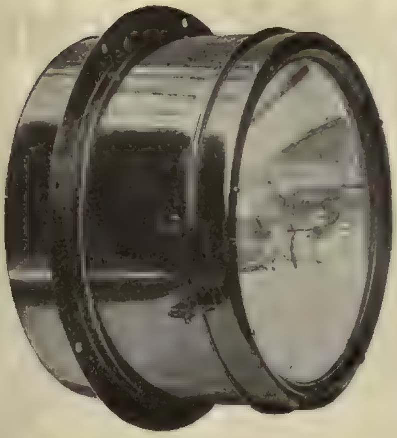

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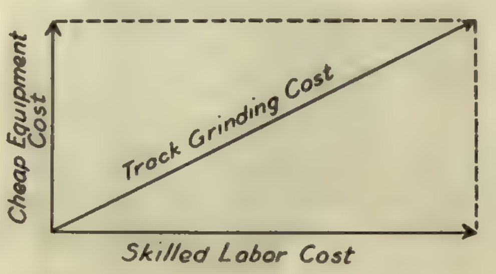
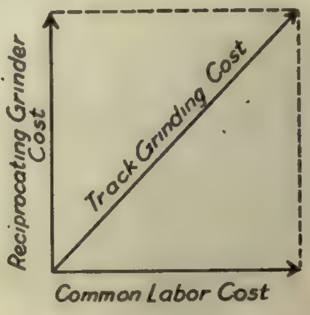
The Component Costs of Track Grinding are Labor and Equipment





The cost of track grinding resolved into its simplest components is, as in most construction work, merely a question of labor and material. In this case the material is more properly called equipment.

These two items of labor and equipment are, to borrow a mathematical term, **dependent variables,** that is to say, the value of the equipment depends on the value of the labor and vice versa.

Cheap grinding equipment demands skilled labor to get anything like a result. Besides, cheap equipment is always inefficient from the standpoint of time—time is wasted on the original grinding, time is wasted in taking two or three licks to do one job. Time wasted means many labor-hours at high rates which makes the labor component so high that the resultant track grinding cost is appalling.

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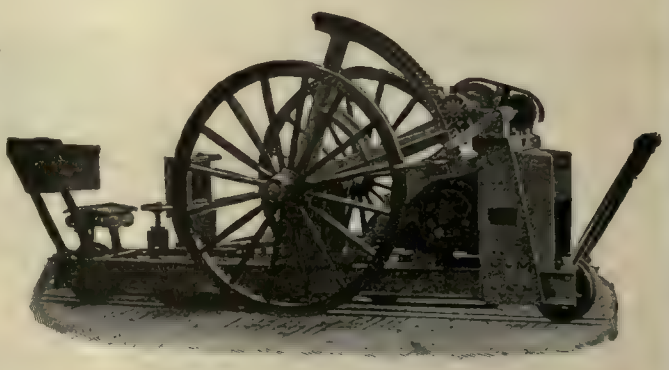

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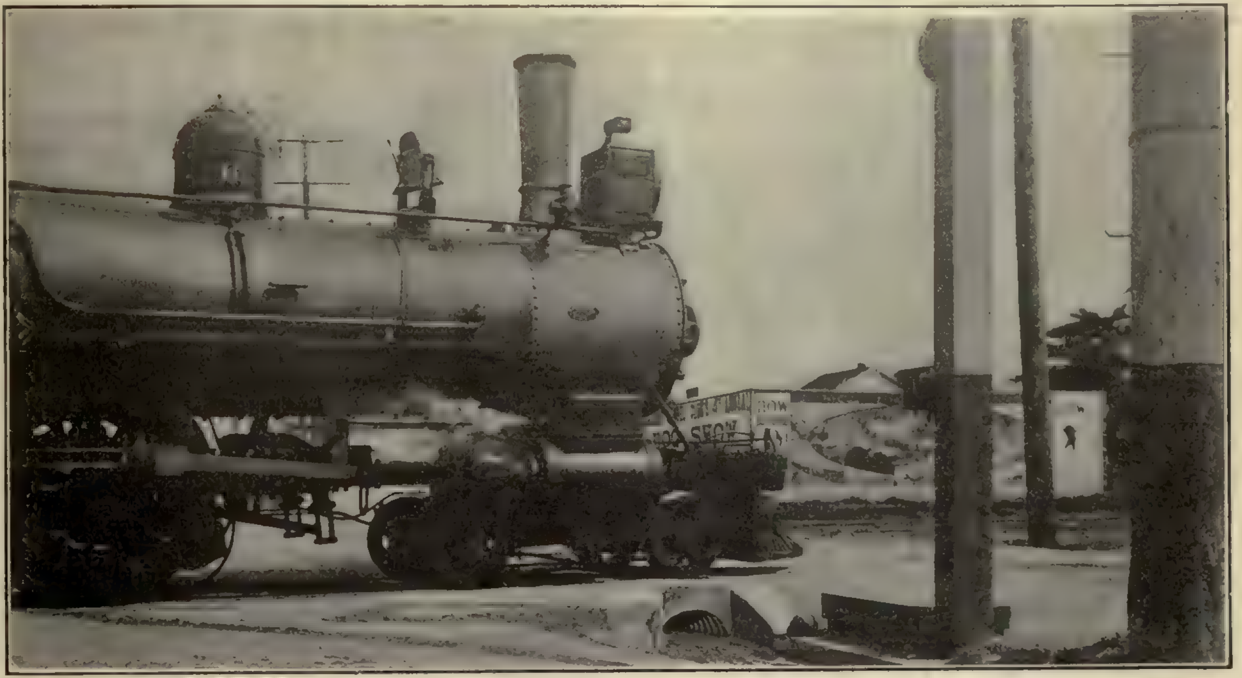

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Three More Large Railways Adopt Garland Ventilators

Public Service-Newark

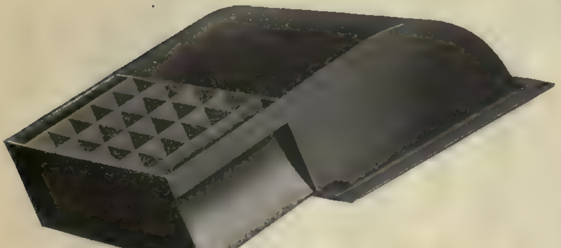
The Public Service Railway Company of New Jersey, one of the largest electric railways, is constructing new cars with a special design composite roof. To obtain a ventilator best suited to their needs we adapted the Garland Design F and the Company purchased 800 of these ventilators for 100 new cars. Adequate car ventilation and comfort for passengers are assured.

Milwaukee E.R. & L. Co.

The Milwaukee Electric Railway and Light Company is building 50 all steel cars and using in them the most approved equipment. After careful consideration and tests, they chose Garland ventilators, similar to the one illustrated here, and have purchased 600 for arch roof application. They are part of a balanced system with air intakes, the ideal method of car ventilation.

New York Railways

When the New York Railways recently ordered 70 new storage battery cars for low speed service they selected Garland ventilators and ordered 280. As in all Garland ventilators, the superior efficiency for low speed cars results from the use of patented curved cowls which so direct the air as to cause a powerful eduction action from the interior. Foul air is rapidly removed.



Garland ventilators are storm proof and side winds and rain are effectively baffled. They are made for all classes of service and roof design. They will remove more foul air from a car body than any other device.

The Most Complete Car Ventilator Catalogue Ever Issued is now being distributed—Free. Send for a Copy.

Holden & White

Electric Railway Sales Distributors for The Garland Ventilator Company

1508 Fisher Building, Chicago

U. S. Metal & Mfg. Company, New York and Washington.
Alfred Connor, Denver
Brown & Hall Supply Company, St. Louis
C. F. Saenger & Company, Cleveland
C. E. A. Carr, Toronto
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What "Van Dorn" Gear Specialization Means to You

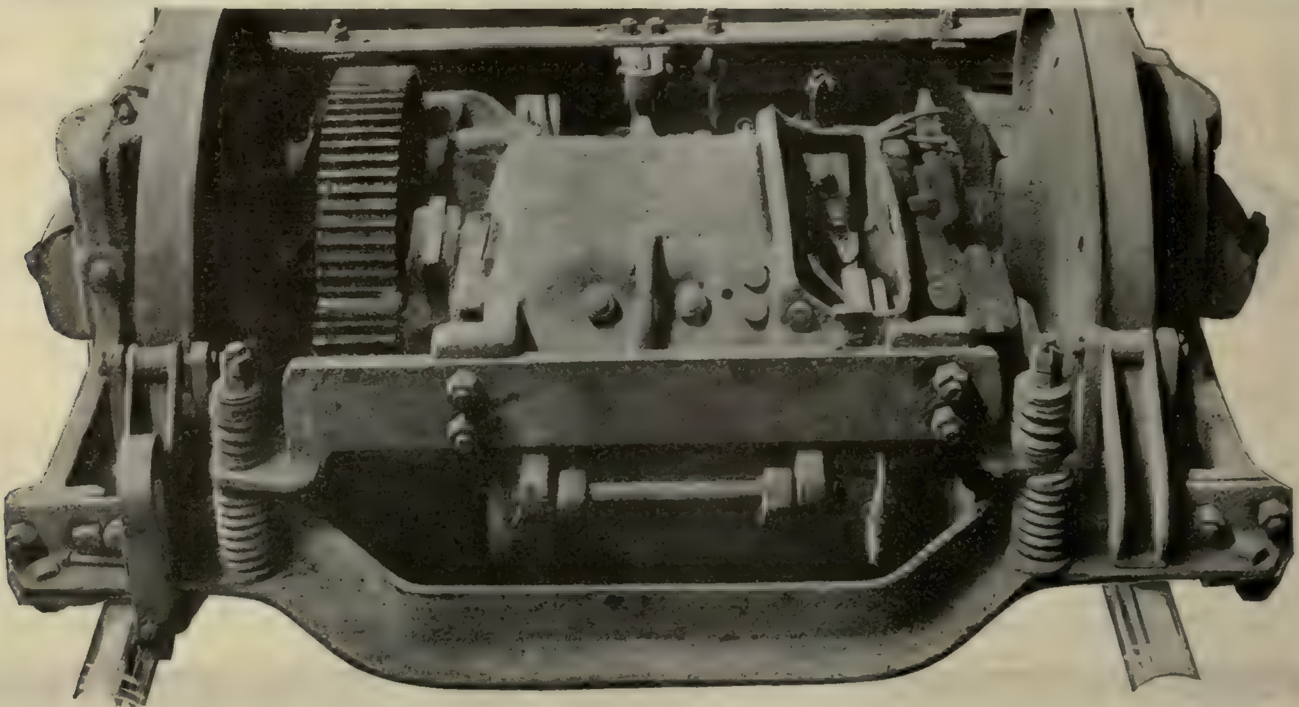
(1) Smooth- and silent-running gears which mesh perfectly, thereby reducing the friction to a minimum. This is due to our skill and the care exercised in cutting the gears.

(2) Gears which will give maximum service and withstand the strain of the heaviest loads and steepest grades without losing their teeth. This is the result of long experience in heat treating and hardening processes.

(3) Perfect gears at all times. Our rigid tests and inspection prevent defective gears from leaving our plant. In addition to the standard tests every Van Dorn gear and pinion is subjected to the Brinell test and bears a card indicating the exact depth of the hardened casing. These features together with the quick deliveries afforded by our large modern plant and favorable location make "Van Dorn" gears the best buy.

Send your specifications and blue prints to Dept. E. R. J. for estimates

THE VAN DORN & DUTTON COMPANY Gear Specialists
CLEVELAND, OHIO



Would You Trust Your Revenue To Good Advice?

Not by a long shot!

Of course you give your new conductors all the good advice and information regarding careful and accurate fare collection.

But you go farther.

You make doubly sure by using fare boxes and other registering devices.

Why?

Because you know conductors are only human and are apt to err and become indifferent.

Your motormen are human, too.

And they're just as apt to err and become indifferent in the operation of the equipment they control.

Careless operation, as you know, wastes your power, damages your equipment, causes discomfort to your passengers and interrupts your schedules.

But you can check up the motorman's efficiencies just as you do the conductors'.

Economy Meters before trained motormen help them maintain economical car operation. They provide a constant check on efficiency in handling controllers and brakes, and act as a constant inspiration to the motormen.

Let us show you what other roads have gained through installation of Economy Meters and what *you* can gain.

ECONOMY
SANGAMO
BUILT LIKE A WATCH
METERS

Sangamo Electric Company
Springfield, Illinois

Specialists in Meters for Every Electrical Need

A—Bronze Lock Nut B—Hollow Steel Case-Hardened Lubricating Shaft. C—Cotter Pin. D—Rivets. E—Steel Adjustment Screws (Right and Left). F—Bronze Contact Spring. H—Cotter Pin Hole. K—Expanding and Contracting Slot.

THE V-K NON-ARCING HARP has a patented adjustable pin-locking device. This affords a rigid bearing for the wheel, which greatly improves current flow, prevents looseness, wear and destructive arcing between pin and harp.

Actual experience proves that the V-K patent locking arrangement adds over 25% to the life of the trolley wheel.

Send for illustrated catalog

MORE-JONES BRASS & METAL CO.
St. Louis, U. S. A.

Bay State—Connecticut—New York Municipal: Practically All the Big Heater Orders Placed by the Biggest Roads in the East, Call for

Two-Coil Cross-Seat Heater With Terminal Cover in Place

Peter Smith Gravity Type Electric Heaters

Because only by the use of Peter Smith Electric Heaters can an electric railway be **sure** of getting heating equipment that is simple to install and economical to maintain—and

Because of the demonstrated ability of the Peter Smith Heater Co. to produce any type of heater and heat control required by its customers.

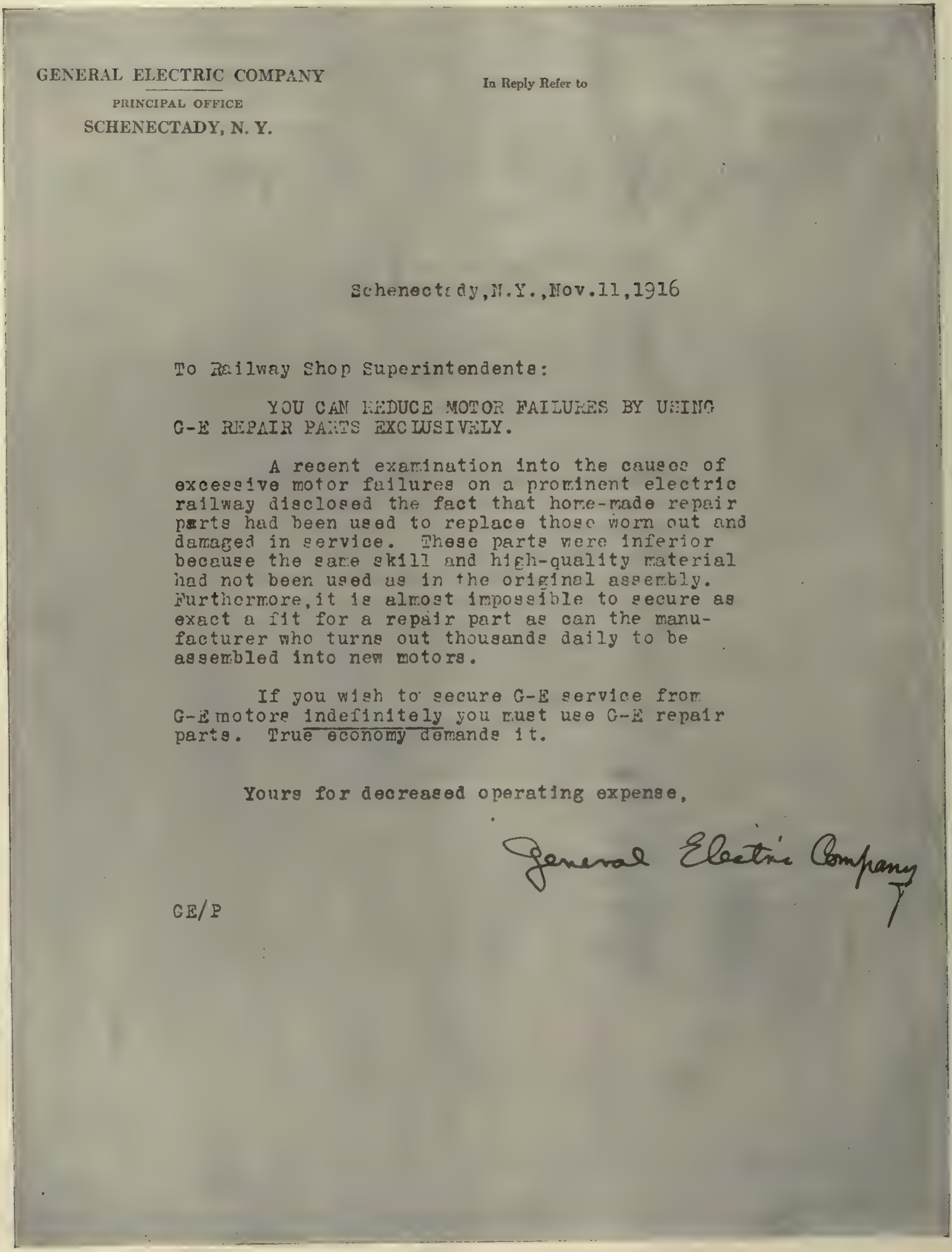
It is interesting to note, also, that nearly all these recent orders call for Peter Smith Thermostatic Control.

Put **your** heating requirements up to the Peter Smith engineers.

The Smith Automatic Switch for Thermostatic Control

The Peter Smith Heater Co.
Detroit, Mich.
Heater Specialists for Thirty-five Years

PS HEATERS



An Open Letter

GENERAL ELECTRIC COMPANY
PRINCIPAL OFFICE
SCHENECTADY, N. Y.

In Reply Refer to

Schenectady,N.Y.,Nov.11,1916

To Railway Shop Superintendents:

YOU CAN REDUCE MOTOR FAILURES BY USING G-E REPAIR PARTS EXCLUSIVELY.

A recent examination into the causes of excessive motor failures on a prominent electric railway disclosed the fact that home-made repair parts had been used to replace those worn out and damaged in service. These parts were inferior because the same skill and high-quality material had not been used as in the original assembly. Furthermore, it is almost impossible to secure as exact a fit for a repair part as can the manufacturer who turns out thousands daily to be assembled into new motors.

If you wish to secure G-E service from G-E motors indefinitely you must use G-E repair parts. True economy demands it.

Yours for decreased operating expense,

General Electric Company

GE/P

Electric Railway Journal

Published by the McGraw Publishing Company Inc.
Consolidation of Street Railway Journal and Electric Railway Review

Vol. XLVIII NEW YORK, SATURDAY, NOVEMBER 11, 1916 No. 20

DO YOUR SNOW-EQUIPMENT OVERHAULING EARLY

The perennial advice to do Christmas shopping early that usually begins to be spread broadcast by everybody to everybody at about this time might well be applied in the case of snow-fighting equipment on electric railways. Indeed, there is even greater necessity for forehandedness in the case of snow-equipment repairs than in Christmas shopping, because the date set aside for the annual exchange of gifts is unalterably a calendar fixture, while the date of the first heavy snowstorm may be almost any time. It is not unreasonable to expect snow on any day after election day, Northern New York having already had a 2-in. fall. Yet a recent trip along the shores of the Great Lakes has disclosed place after place unprepared, sweepers and snowplows being stowed away at the ends of long lines of summer equipment, sadly in need of inspection and at least some repairs. If the same situation exists in the stores department, and there is only an insufficient supply of salt, brooms and shovels, it is safe to say that the first snow-storm will be in the nature of a disaster in disorganizing the service and in direct loss of revenue—the price paid not only by those lacking in foresight, but by those too busy with other things to exercise it.

MAKING FARE ZONES UNIFORM

A favorable answer to the Massachusetts Northeastern Street Railway's petition to the New Hampshire Public Service Commission for the right to establish a 6-cent fare unit on its lines within the Granite State was in a measure expected, in view of the fact that the Massachusetts board had allowed the 6-cent rate for lines of the company operating under its jurisdiction over a much more populous territory. The two commissions sat jointly during a part of the hearings on the new tariff, and their similar though separate conclusions are welcome. One point of special interest in the New Hampshire case has to do with the length of fare zones. To the disadvantage of the company, a single fare has previously prevailed over the Hudson-Pelham Center line, which is 6.22 miles in length, as compared with an average zone length of about 3 miles on the system. The commission logically held that the maintenance of so long a zone was an unjustified discrimination, and it approved the subdivision of the long zone into two virtually equal sections. By this action, the company will secure a much fairer return for its service over the section in question, and the public over the entire system will receive uniform treatment as to rates. The case illustrates the point that rates may sometimes be discriminating and at the same time most unprofitable to the operating utility, and that local increases may offer the most equitable solution from the dual standpoints of the company and its patrons.

FINANCING THE BOMB SQUAD

"It is all beautifully simple. You give the strikers a nickel and they buy a brick with it and soak you with the brick." Thus spoke Don Marquis recently in his column in the New York *Evening Sun*, in satirically commenting upon the fact that striking carmen in New York City were stationing organ grinders along the streets to beg financial aid from the general public. When we published Don Marquis's remarks in last week's issue, however, their truth had not been fully brought home to the public. Last Saturday four officials of the union local, a striking subway guard and a chauffeur were arrested and charged with complicity in a plot that had resulted in the dynamiting of the 110th Street and Lenox Avenue subway station on Oct. 25. Probably the most striking revelation made by the police was that the money used to buy the dynamite and carry out the plot came from the nickels and dimes taken in by the strikers' hand-organ collectors. The folly of lending financial aid in a haphazard manner to an uninvestigated, and, on its face, questionable cause, was never better illustrated. It is to be hoped that the public has learned its lesson. The Amalgamated Association officials promptly disclaimed any knowledge of the plot, but it would have been very much more to their credit if they had been responsible for its detection rather than the police, especially as they should have known what the local treasurer was doing with the money collected. The least thing which these officials can now do is to make plain to both public and police that they are co-operating to the fullest extent with the authorities in running down all who had anything to do with this dastardly outrage.

CAR SHORTAGE AFFECTING POWER PRODUCERS

Reports from western Pennsylvania and Ohio indicate an unprecedented situation in that power producers are unable to obtain deliveries of steam coal under their contracts, the reason being the inability of coal producers to supply fuel according to agreement because of a severe and apparently growing shortage of cars. In the absence of extended storage supplies of coal, this places before the power station operators the sole alternative of going out in the open market and purchasing fuel at prices two or three times greater than those normally obtaining under long-time contracts, and where the demand is for 100 tons or more daily the added expense becomes staggering. The situation seems to have become acute only within the past couple of weeks, and it is, of course, possible that it is sufficiently local in character to be short-lived. Nevertheless, under present conditions, wherein the regulation-hampered transportation systems of the country are glutted with freight that their arbitrarily-restricted facilities cannot handle, it becomes quite possible for such a coal-car shortage as exists in Ohio to spread over a considerable area, and it behooves every electric railway that produces its own power to be prepared to meet the condition. Stored coal is, perhaps, the most obvious safeguard, but another is the purchase of private cars by the power producer for use only in his coal service, and at least one of the companies affected by the present situation is considering this plan. However, whether this would be more desirable than the costlier plan of coal storage is incidental. The immediate necessity is preparedness in some form in case the coal-car shortage spreads.

AXLE-MOUNTED MOTORS ON FLEXIBLE TRACK

In connection with our comment of three weeks ago on the absence of damage to the track on the Chicago, Milwaukee & St. Paul Railway's electrified divisions there has been raised the question of cause and effect, reference being made to the fact that direct-mounted motors of very much less weight than those on the Milwaukee invariably make trouble with rails laid in city streets.

Admitting this to be absolutely true, however, does not render unreasonable the results that have been obtained with the Milwaukee's axle-mounted motors. On a track that is laid according to steam railroad standards, vertical flexibility is invariably present. Each tie "pumps" through a goodly fraction of an inch as heavily loaded wheels pass over it, and the rail, during the passage of a train, moves in a clearly-defined series of waves. In consequence of this freedom from rigidity, joint trouble such as that which occurs on city systems, where the rails are held rigidly in the plane of the street pavement, is absolutely unknown. Although the use of plain joint plates having only four small bolts might appear to be an invitation to joint trouble from the viewpoint of a city railway's maintenance engineer, such a construction has been in use for years under heavy electric locomotives without any evidences of distortion.

Flexibility of roadway is, no doubt, dependent to some extent upon climatic conditions, as exemplified by the fact that rail breakages on steam roads are more frequent in winter than in summer, one frequently advanced reason being that the frozen ground acts like a solid anvil upon which the rail is pounded. Yet the assumption of a hard-frozen track involves also the assumption of insufficient or imperfect drainage, and where ballasting of desirable materials and ample depth is provided it is difficult to see wherein general track conditions could be greatly affected by the existence of low temperatures.

In brief, the electrically operated railway, heretofore, has been almost invariably compelled to provide extreme rigidity of track, and with this has developed a conception of the phenomena of rolling loads that is based primarily upon this condition. Now that electric equipment is coming to be used upon the non-rigid roadbed common to steam railroad practice, a revision of ideas seems to have become necessary.

RAIL CORRUGATION STUDIES IN CHICAGO

The further testimony on the subject of rail corrugation, presented this week as a result of the studies made in Chicago, throws interesting light on the subject, although it does not conclusively prove or disprove any of the theories which have been advanced to account for this most mysterious phenomenon. Chicago is peculiarly well suited for a study of this kind, because much of the rail there was laid at about the same time, and also because two distinct types of track sub-construction were employed, namely, concrete and ballast. As steam railroad track which is laid on ballast is much less subject to corrugation than electric railway track, it has been hoped that the use of ballast in city track would reduce the trouble, but practically no difference was found in Chicago between the two types of sub-construction used. The natural conclusion is that where heavy girder rails are held tightly in the pavement and the sub-grade and ballast are thoroughly rolled, the conditions are as favorable to the development of corrugation—if corrugation is caused by rigidity—as if the track was laid on concrete.

The relation of the contour of the wheel to that of the rail was also considered in the Chicago analysis, and the conclusions reached were the same there as elsewhere, namely, that where the bearing of the wheels on the rail is only along the gage line, the steel in the rail becomes cold rolled and corrugation begins. As observations in the field showed slightly greater signs of cold rolling on rails having considerable corrugation than was found on rails where the wear appeared only along the gage line, the Chicago engineers believe there is some connection between the amount of cold rolling and the amount of corrugation, although they take care to explain that the cold rolling may have been effected by many other causes than merely by a difference in contour between wheel and rail.

Those in charge of the analysis do not advance any theory as to the cause of rail corrugation as a result of their observations. This is a wise policy, because while we believe the ultimate cause or causes will be determined and that progress is being made in this direction, we do not believe that the solution will be found from a study of the conditions on any one property. If it was otherwise, the cause would have been determined long ago. Nevertheless, it is only by such studies as have been made in Chicago and conducted with equal care that the problem will be solved. The answer is elusive, but that fact should not discourage investigation. Rather it should make the solution all the more eagerly sought.

Cure the Sores in Time

The Early Use of Publicity Ointment Would Have Saved This Doctor's Visit

UNLESS your road is the Millennium Rapid Transit Company there are sore spots in your relations with the public.

These may be caused by things that you have done or left undone; in either case they are dangerous if neglected.

The only way to cure these sores before they become dangerous and require the services of a doctor (or perhaps of an undertaker) is by applying THE OINTMENT OF PUBLICITY.

Publicity means an attempt to bring about an understanding with the public even if it involves a frank confession that for once the railroad was wrong but won't do it again.

Some publicity campaigns are principally noteworthy for the ingenious presentation of subjects that the railroad wants the public to think about; there is always, and properly, more or less matter of this kind.

But the KIND OF PUBLICITY THAT STICKS ITS HEAD IN THE SAND never accomplishes very much; the successful publicity campaign must concern itself with things about which the public is clamoring for information.

Why can't I get a seat? Why can't we have more transfers? My taxes have gone up, why shouldn't yours? These are the kind of questions that car riders want answered.

To ignore these and more serious questions only leads to the formation of convictions almost invariably hostile to the utility corporation.

If explained as they arose there would be few serious controversies between corporations and the public they serve.

Very often a thing can be explained BEFORE IT OCCURS; a new type of car or a change in service or a franchise extension can be prepared for in a way to make it popular.

These things don't "happen." They are premeditated. Practically everything which the railway does is premeditated. Changes such as those mentioned should be bulletined to the public long in advance.

Or the railroad can stand mute until some newspaper springs the story in such a way as to put the corporation in wrong from the start.

In the latter case the corporation has an uphill fight on its hands—a fight which A SIMPLE REMEDY or A LITTLE FORESIGHT would have avoided.

If there is not a conscious policy of "taking the public into your confidence," the question,—What will people say?—is not likely to be asked with sufficient frequency or seriousness.

The safest way is to have a man on the staff whose particular and only business is to ask that very question, WHAT WILL PEOPLE SAY?

And to do everything humanly possible to avoid the thinking and saying of things that are untrue, unfair or unpleasant.

Yes, you have guessed it. Such an individual is known as a PUBLICITY MAN.

An Interurban Freight Line in the Farthest Northeast

Two-Thirds of the Revenue of the 32-Mile Aroostook Valley Railroad of Northern Maine Is Obtained by Handling Lumber and Farm Products in Twenty-Car Trains That Are Hauled by 1200-Volt Locomotive Equipment

WITHIN a few miles of the international line that bounds the State of Maine on the East, and in the extreme northeastern corner of the country, is an interurban property, the Aroostook Valley Railroad, that may justly lay claim to distinction upon grounds other than its geographical location. Since the completion, some four years ago, of the 32-mile route now in service, a freight business amounting to upwards of $60,000 per annum has been developed, so that this field of revenue actually brings to the company about double the returns that are obtained from passenger service.

The original section of the road to be constructed extended between the towns of Washburn and Presque Isle with a spur to make a connection with the Canadian Pacific Railway at Washburn Junction, the latter being a town of 800 inhabitants, while Washburn and Presque Isle have populations respectively of 1600 and 3000. This section of the line, which was built in 1910, was about 10 miles in length, passing through several small villages en route. In 1912 the road was extended north and east from the terminal at Washburn to West Caribou, this being a village across the Aroostook River from the town of Caribou which has a population of 5500 and is the largest community in the district, and an 8-mile branch was built northward to Sweden, a town of 1000 population.

All of these towns are located in the midst of an extensive farming and lumbering district in Aroostook County, famous almost the world over for its potatoes since the county alone contributes the major portion of the annual yield of potatoes for the State of Maine, approximating 24,000,000 bushels. In addition, large quantities of hay and other produce are raised for shipment, and there is an extensive lumber trade throughout the district, as it is on the edge of the still unexploited sections of the Maine woods whose supplies of timber once made the shipbuilding industry of the United States a dominating influence in the world's commerce.

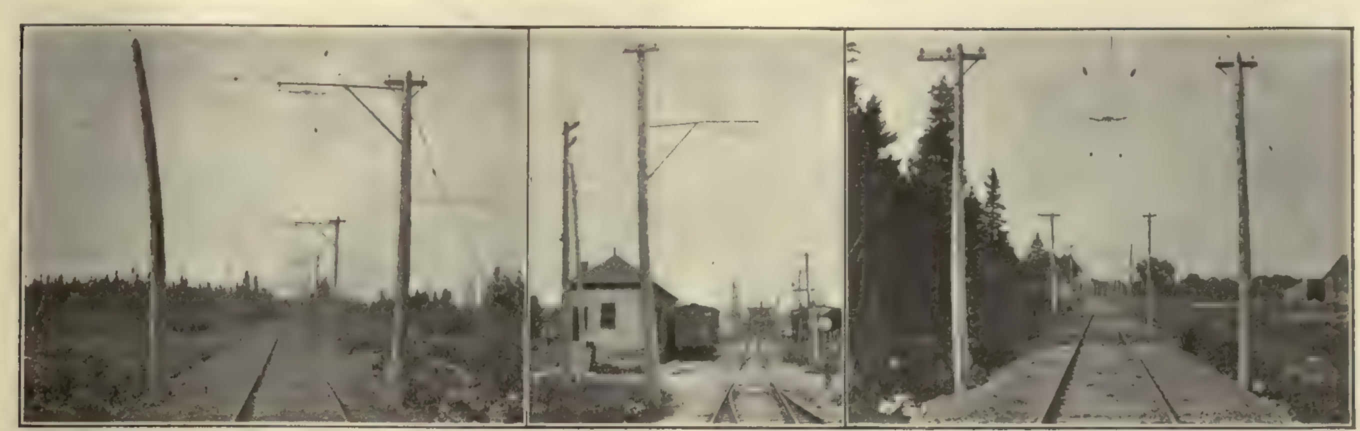
Because of the relatively small population of the communities within the district and the extensive farming and lumbering industries the freight business of the railway has been developed with greatest rapidity. For the year ending July 1, 1915, the freight that was handled amounted to 75,580 gross tons. Included in this traffic, outward bound, were more than 1,000,000 bushels of potatoes and large quantities of lumber, starch and hay. In addition there was an inward-bound traffic of fertilizer, grain, flour and other supplies. A considerable portion of the traffic is interchange freight with the Canadian Pacific Railway, physical connection between the two roads being made at the previously-mentioned town of Washburn Junction. An extensive package and light express business also is carried on by utilizing the baggage compartments of the regular passenger cars, since the small villages through which the line passes have no means of communication with the outside world other than wagons that have to be hauled over bad roads through a heavily wooded and rough country.

AROOSTOOK VALLEY RAILROAD—CONCRETE ARCH BRIDGE OVER PRESQUE ISLE STREAM

As remarked above, the railway operates 32 miles of route, providing 37.7 miles of single track, and 1200-volt equipment is used. Train service is conducted strictly in accordance with steam railroad standards for both passenger and freight movements, a chief dispatcher being located at Presque Isle from which office telephone connections are maintained with the various sidings and terminals. At the present time the passenger service consists of six trains per day in each direction, four between Presque Isle and Caribou and two between Presque Isle and Sweden. The freight traffic is handled by a single train that makes a round trip over the entire line each week day. Trains of more than twenty cars are frequently hauled during the winter season when traffic is heavy, advantage being taken of the fact that grades are generally in favor of the heaviest shipments.

TRACK AND OVERHEAD

The entire road is laid with light grades and curves and is thus adapted to handling an extensive freight traffic. With a few exceptions the grades are limited to 1 per cent, generally in favor of the outward-bound



AROOSTOOK VALLEY RAILROAD—TYPICAL BRACKET CONSTRUCTION FOR 1200-VOLT CONTACT SYSTEM; OVERHEAD CONSTRUCTION AT SIDING, SHOWING ABSENCE OF FROGS; SPAN CONSTRUCTION FOR 1200-VOLT CONTACT SYSTEM

traffic, and surveys have recently been made with the idea of reducing still further the maximum grades. The road is single track throughout and is constructed over a private right-of-way with the exception of about 2 miles east of the town of Washburn, where the tracks follow a highway. For the overhead contact system both bracket and span construction are used with 30-ft. wood poles and a direct-suspended No. 0000 trolley wire. The only feeder copper that is installed in addition to the trolley wire is a single No. 0000 wire extending from the substation at West Caribou for a distance of 12 miles along the outlying branch to Sweden. Of course, the track is of standard gage, and it consists of 70-lb. steel rails with No. 0000 concealed bonds. At the sidings and spurs the use of frogs has been avoided altogether. To this end the trolley wire from each siding is brought out parallel to the main line for a suitable distance and there is no connection between the two contact wires. While this necessitates changing the trolley pole when a siding is entered, a train which is about to be sidetracked is usually approaching at a low speed, while trains that are moving along the main line are usually running at full speed. In any case it is considered that, with a trolley frog in the wire, it would be necessary for the conductor to look after the trolley pole to a certain extent, and therefore the shifting of the trolley pole involves but little additional effort.

Two bridges of interest from a civil engineering standpoint are used on this road. One of them, which crosses the Aroostook River between Washburn and Presque Isle, consists of steel girders mounted on a series of solid concrete piers. The other is located on the freight line that makes connection with the Canadian Pacific Railway at Washburn Junction and crosses a tributary to the Aroostook River called the Presque Isle Stream. This bridge, 100 ft. in length, is constructed of reinforced concrete and it replaces a pile trestle which was removed to effect a reduction in grade.

Numerous spurs and sidings have been constructed at various points along the line to reach the storage warehouses that have been constructed by the company for holding potatoes and also for incoming freight. The

AROOSTOOK VALLEY RAILROAD—STEEL BRIDGE OVER AROOSTOOK RIVER

AROOSTOOK VALLEY RAILROAD—CARHOUSE AT PRESQUE ISLE

AROOSTOOK VALLEY RAILROAD—TYPICAL WAY SHELTER

use of storage warehouses is almost essential to the handling of freight traffic in this locality, since large quantities of potatoes and hay must be stored for winter shipment in accordance with market conditions, while many carloads of fertilizer and other supplies must be held until road conditions will allow heavy teaming to farms that are located at some little distance from the railway line. Altogether the Aroostook Valley Railroad has the equivalent of sixty-three 50-ft. storehouses which are reached by the company's tracks.

POWER SUPPLY AND SUBSTATIONS

All electric power required for operating the railway as well as for the local power and lighting in the various towns along the route, is supplied by the Maine & New Brunswick Electric Power Company, Ltd., from a hydroelectric plant located on the Aroostook River about 2 miles across the international boundary in the province of New Brunswick. This power station contains one 1500-kw. and two 500-kw. horizontal units operating under a 78-ft. head. The dam is about ½ mile above the power house and water is conducted to the fore bay through a canal cut out of solid rock. The water supply is ample at all seasons and no steam or other reserve power is required for the system. Sixty-cycle power is generated at 11,000 volts and is transmitted to substations at this voltage. In addition to the railway load the power company supplies electricity for a large number of towns in this section of the State of Maine, the entire system including 115 miles of transmission lines operating at 11,000 volts and 45 miles operating at 33,000 volts.

One of the railway company's substations, which is located at the town of Munson Hill on the

AROOSTOOK VALLEY RAILROAD—FREIGHT TRAIN HAULED BY 40-TON 1200-VOLT ELECTRIC LOCOMOTIVE

Aroostook River midway between Presque Isle and Washburn, is supplied over an independent line usually operated from a separate generating unit, while the other railway substation, located at Caribou, takes care of a combination railway and power load.

These two 1200-volt direct-current substations, which supply all current for operating the railway, contain similar converting equipment. In each is installed two General Electric 200-kw., 600-volt synchronous converters operating in series to give 1200 volts. The transformers are of the single-phase oil-cooled type rated at 110-kw. each and wound for 11,000 volts primary with 370-volt double secondaries. Thus the total transformer capacity is 330 kw., or approximately 80 per cent of the normal rating of the converters. This capacity is ample, however, since the railway load is intermittent and the peaks are of short duration. In addition to the railway equipment each substation contains an 11,000-2300-volt transformer for supplying both local lighting and power service.

The switchboards include the usual machine and feeder panels of standard 1200-volt type, and have the circuit breakers and switches mounted at the top of the board, operation being effected by a control handle placed in the middle section of the panel. Each of the substations is operated on a single twelve-hour shift, this lasting in one case from 7 a. m. to 7 p. m. and at the other substation from 6 a. m. to 6 p. m. Any additional service that may be required is obtained by calling upon the operator to work overtime.

ROLLING STOCK

The passenger equipment includes four interurban cars, each having a compartment for baggage and express. Each car is equipped with four General Electric No. 217, 600-1200-volt, 50-hp. motors geared for a speed of 35 m.p.h. Two of the cars have Type-K control and the other two Type-M control. Control current at 600 volts is obtained from a dynamotor, which furnishes also the current for lighting and for operating the CP-24-cu. ft. air compressor on each car. General Electric straight-air brakes are used for all cars. Electric heaters are used and these are fed directly from the 1200-volt trolley.

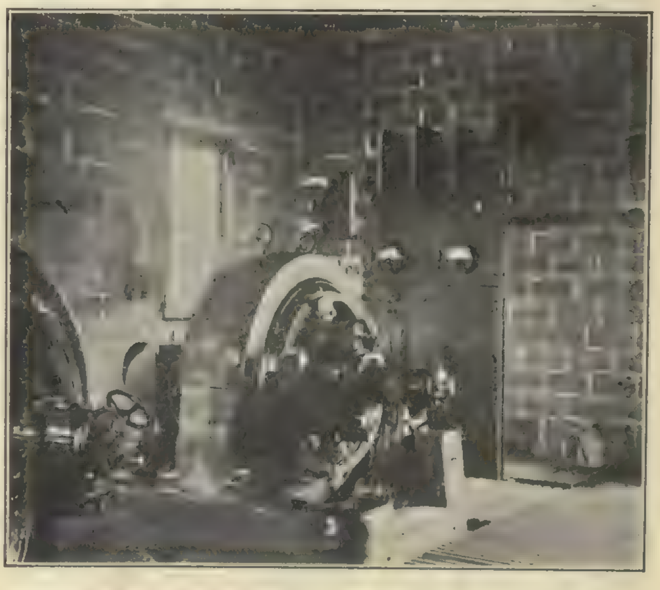
The equipment for handling freight service includes one 40-ton locomotive and an express car weighing about 30 tons which can be used also for hauling the trains when this is necessary. The locomotive is of the center-cab type with sloping end cabs for housing the equipment, the center section containing the controller, air compressor, etc., and suitable accommodations for the operator. The locomotive is built for straight 1200-volt operation and is equipped with four General Electric No. 206, 600-1200-volt motors and Type-M multiple-unit control. Compressed air is furnished by two CP-29 1200-volt air compressors and a dynamotor furnishes 600-volt control current, the air brake being of the combined straight-air and automatic type suitable for handling standard freight cars. The heavy locomotive-type express car is equipped with four General Electric No. 205, 600-1200-volt, 75-hp. motors and Type-M multiple-unit control.

All repairs and inspections of rolling equipment are made in a two-track repair shop located at Presque Isle and supervised by one competent repair man who is also an armature winder. As required, a helper is called in for making heavy repairs, but as a rule the one repair man is able to handle all maintenance work. A regular inspection of the equipment is made twice each month and light inspections are made daily. Two of the cars which have seen the most service have made 158,000 miles and 138,000 miles, respectively, without the removal of an armature, and the electric locomotive has made 100,000 miles to date without any delays due to electrical equipment. The average cost of power for moving trains is given as 4.27 cents per passenger car-mile and 3.3 cents per freight car-mile.

AROOSTOOK VALLEY RAILROAD—SUBSTATION AT CARIBOU

PLANS FOR EXTENSION

An important addition to the existing system is definitely projected at the present time, and all surveys and preliminary work for the construction have been completed. This new line will be known as the Quebec Extension Railway and it will extend westward from the town of Washburn for more than 100 miles across the northern portion of the State of Maine to the Quebec border. This project is intended primarily as an electric freight road connecting with the Quebec Central Railway in Quebec and with the Canadian Pacific Lines in New Brunswick, and it will constitute a direct route cutting more than 100 miles from the present haul through the provinces. The profile of the new line is distinctly suited to the hauling of heavy freight, the maximum grade being 1 per cent. Present plans contemplate the use of direct current at a voltage of 1200 or more for the contact line. Traffic will be handled with locomotives for the freight service and multiple-unit trains for the passenger service, according to the ideas of the officers of the company, who are A. R. Gould, president; L. E. Gould, vice-president; M. S. W. Dingwall, general superintendent, and H. N. Crandall, treasurer.


AROOSTOOK VALLEY RAILROAD—INTERIOR OF MUNSON HILL SUBSTATION

Determining Reasonable Rates Under Municipal Ownership

Rates Should Be Fixed in Same Manner as Those for a Utility Privately Owned, Surplus Going to Credit of General Tax Fund

A PAPER that hits directly at a fundamental injustice toward privately-owned utilities on the part of cities which are inclined toward municipal ownership, was presented on Oct. 18 by J. B. Lippincott before the American Society of Civil Engineers. This paper, which was entitled "A Method of Determining a Reasonable Service Rate for Municipally-Owned Public Utilities," was published in the September issue of the *Proceedings* of the society.

To show the necessity of a more sound understanding of the fundamental basis of proper rate regulation, Mr. Lippincott states that for California, with the steam railroads excluded, the value of municipally-owned utilities is only 5.1 per cent of those privately owned. A new and undeveloped state, such as this one, manifestly cannot publicly build all its utilities, but of late and at present voluntary investment in privately-owned utilities in California is awaiting the determination of public policy in regard to protection of private investments. Heretofore the fixing of rates for municipally-owned utilities in California has often been looked upon as a political rather than as an economic question, it being a popular and easy road to public favor to advocate the reduction of any rate. To Mr. Lippincott's mind, however, the rate for utility service should be based on the fair value of the property used and useful, irrespective of whether the plant is privately or municipally owned. The municipal plant should be viewed as an investment of public funds by the city, and it should be operated with the view of obtaining a profit on the investment.

PRIVATE UTILITIES SHOULD BE PROTECTED AGAINST UNJUST COMPETITION

If the rates for the service of publicly-owned utilities are too low and deficits are made up from the general tax fund, such administration is unfair to privately-owned utilities and will tend to discourage the investment of private funds therein. Although the public should be able to enjoy the profit and security of its own service, there is a broad equity involved that requires the protection of the privately-owned plant which has been built in good faith and is being operated under public regulation so that its rates are just and its service adequate. It would be a public misfortune to confirm the impression that private investments are to be overridden unfairly and in such a way as to injure legitimate investment. If unfairness is practiced in the larger centers of population, having substantial bonding resources, it is likely to delay the development of the back country, where public credit for large enterprise is lacking.

In short, therefore, Mr. Lippincott believes that capital invested in private utilities should be protected against unjust competition by publicly-owned utilities. If this is to be accomplished, greater attention must be given to the rates of the publicly-owned utilities. Private rates should be sufficient to provide, first, for the expenses of operation and maintenance; second, for depreciations, and, third, for a return on the fair value of the property. This last item will provide interest on the bonded debt and any profit accruing to the owner. The same rate elements would apply in a case of a publicly-owned utility, but there would be an additional expense for a bond redemption fund. This has no counterpart in a privately-owned plant, as the bonds of the latter are seldom retired, but on maturity are taken care of by a refunding process.

BEARING THE COST OF MUNICIPAL OWNERSHIP

There are four classes of people, Mr. Lippincott states, who should assist in bearing the cost of a municipally-owned public utility: (1) The city as a whole, or the government; (2) the consumer; (3) the owner of vacant lots, and (4) the real estate promoter who desires extensions made to new subdivisions.

1. *The city's share of the expense:*

In Mr. Lippincott's opinion, the city should provide from the general tax budget the annual contributions to the bond redemption fund for the municipally-owned utility. If the municipality's credit has been used in the issuance of bonds for the purchase or reconstruction of the utility plant, then the refunding of these bonds from the general tax budget is virtually repayment for the plant by the city as a whole.

2. *The consumers' share of the expense:*

The consumer should pay for the operation and maintenance of the system and, if the municipally-owned utility is to be treated on the same plane with one privately owned, depreciation and interest on the fair value of the property should also be charged to the consumer. To deduct depreciation and interest from the rates would put such a handicap on competing privately-owned utilities that they probably could not live. Any profit should be expended in the ordinary extensions and betterments to the system, so as to avoid the necessity for frequent bond issues to make these improvements. If any surplus accrued over and above such expenditures for improvements and betterments, it should be turned into the general funds of the city for the purpose of reducing taxes rather than rates.

There are two classes of consumers for a municipally-owned plant, those who are not taxpayers in the community and those who are. The consumer who does not contribute taxes is paying a fair price for the service received, and he is not entitled to have the cost of this service reduced simply because he happens to be temporarily a resident of the community. On the other hand, property owners have guaranteed the payment of the public debts. If the bond redemption fund is provided for from the general tax levy, all taxpayers are proportionate owners of the utility. A share of the profits accruing from this ownership should revert to the taxpayers through the general fund, so that the consumer who is a taxpayer will receive an indirect benefit from the ownership of the utility.

3. *The vacant-lot owner's share of the expense:*

Unless a charge is assessed against owners of vacant lots, they secure benefits without adequate contributions to cover the expense of the utility plant. Some system of assessment on such vacant property on a frontage basis should be developed to cover this element, as is often done in street paving and sewer work. Moreover, there are many vacant lots in the old and established portions of the city where the plant has long been built, and lot owners here cannot be assessed as in the case of extension to a new division. Possibly they should be charged an assessment each year, which should go into a fund for ordinary betterments of the system or into the public treasury.

4. *The real estate promoter's share of the expense:*

The real estate promoter, Mr. Lippincott says, is continually making new subdivisions and petitioning the utilities, whether publicly or privately owned, to make extensions therefor. With publicly-owned utilities it is usually demanded that the promoter shall pay for the cost of extensions. This policy has been followed by many of the publicly-owned utilities, but it has resulted in political agitation and has been vigorously resisted by the interests who are active in their efforts to speculate on the community. It would be equitable, however, to require the owner to pay a frontage tax to cover the cost of the utility system fronting the property in question, this contribution is to be returned when this part of the plant is on an earning basis. As regards main plants built for the distant future, which may equitably be assumed to involve the promoters' lands, a portion of the cost of the excess capacity should justly be charged to the promoter.

In conclusion, Mr. Lippincott states that this whole problem of establishing municipal utilities on the proper rate basis cannot be solved with a rule that will apply to all cases. A general theory on which all muncipalities should proceed, however, should be adopted. The cities of the country should be managed fairly and scientifically, not only for the interests of the citizens therein, but also for those who have financed in one way or another their utilities and early development.

Reading of Technical Journals Necessary

Those Who Keep Their Knowledge and Practices Up to Date by Such Reading Show It by the Condition of Their Properties

THE last issue of the *Southwestern Electrician* contains a letter from H. S. Cooper, secretary Southwestern Electrical & Gas Association, on the reading of technical journals. Some extracts follow:

"In recent trips among the members of this association I have been impressed with the great differences in practice in certain matters where it would seem that there could be no two opinions on the subject. One of these matters was in the use of the technical journal; in some offices I found them carefully opened, piled and filed convenient to the hand of the manager or other head of department, or of their clerk or stenographer. From such a good operative arrangement the practice 'ran down' until in some offices the journals were flung unopened into a corner or on the end of some table or desk, there to lie in dust and disgrace until the janitor gathered them into the trash barrel.

"Now, apart from the fact that such a practice as the latter is a direct waste of the subscription money, lies the farther fact that the officer or official who so neglects valuable and timely sources of information on subjects that are of direct importance to his employer is not properly earning his salary! That may seem a strong way of putting it, but it is nothing but the truth, and I have found it almost an invariable rule that the officer, official or head of department that was 'slack' in the reading, saving and filing of the technical journals pertaining to his business was only one degree removed from the one who did not take them at all 'because they cost so much.'

"One of the duties of my official position is to keep acquainted with the contents of the various technical and trade journals and publications that apply to the various kinds of public utilities that are members of this association. These publications grade from 'good' through 'better' to 'best.' There is none of them that I could conscientiously say is useless or poor. In every one of them I find something that I know to be of value to some of the members—either directly at once or to be filed for future use and emergencies. And to those capable and conscientious operatives who properly use their journals there is the same result; a hint here, a suggestion there, here a little information of instant value, there something to be remembered and filed against some future condition.

"This applies not only to the 'literary' portion of these publications, and he who thinks that this is their only value is badly mistaken. Not only to the purchasing agent but to every head of department does the 'advertising section' appeal. The manager, superintendent or foreman who does not keep up with what is new in the materials, machinery, appliances and apparatus of his particular line or department is only performing a portion of his duty, he is out of date, behind the times —a 'has been'!

"The technical or trade journal of to-day is the livest, most 'up-to-now' assistant that the public utility man has. It is carefully edited, well printed, fully illustrated, thoroughly indexed both as to literary matter and advertisements. It is the Always Ready Reference of the minute, and the officer, official, head of department, or even workman, who does not use it is neglecting one of his best friends!

"And that leads me to another matter; that is, that I have been surprised to find how many of the larger utilities are actually stingy when it comes to paying out money for subscriptions to their trade and technical journals. They talk about the one, two or three dollars per year as if it were that many hundreds; they look at the expenditure as if it were an expense instead of an investment which, properly handled, will bring them good returns. Of course, if the journals when received are treated like stepchildren or poor relatives, left unopened, thrown into corners, unread, unhonored and unused, then they are a very costly expense, for such treatment of a most useful adjunct of the business soon transmits its influence to other portions.

"Now, I am not soliciting subscriptions for any trade or technical publication, I am not interested financially in any of them, my only interest in their use is that I have not only found them of immense value in all the businesses which I have managed, but I have yet to find a real up-to-date, hustling, successful manager or head of department who does not promptly and fully read his technical and trade publications, note and file the matter that interested him or was or would be of use to him in his business. * * * And in no other way can any operative, no matter how high or low his position, keep so fully abreast of the times in his business as by early and careful perusal of his trade and technical periodical from its front to its back cover. And from no other source can he obtain the 'immediately useful' as he can from a well-filled and indexed present volume of those same publications.

"Those who have tried this know that the above is the truth. Let those who have not tried it give it a trial for six months or a year and they will thank me for calling their attention to this matter!"

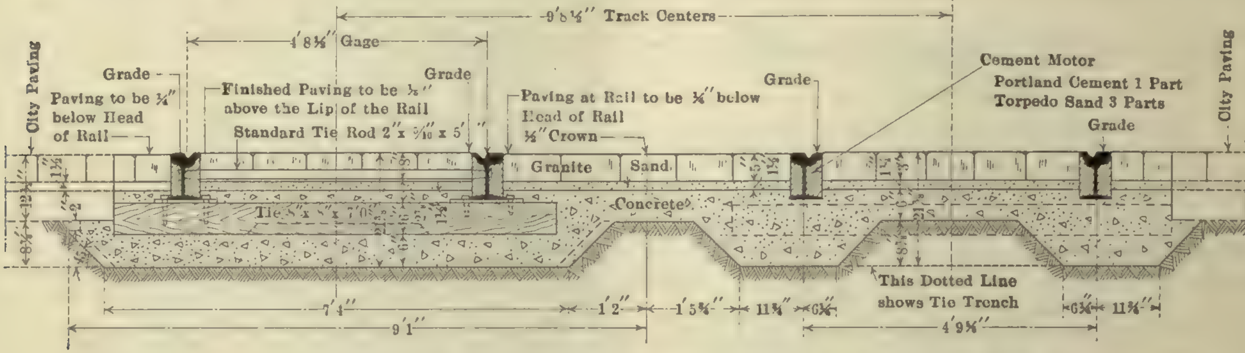
New Traffic Ordinance in Portland, Ore.

The new traffic ordinance in Portland, Ore., held in abeyance since Oct. 1, has been amended and placed in effect. In accordance with a general request from automobile owners, vehicles of all sorts will be permitted to pass to the left of standing street cars. As originally framed, vehicles were prohibited from passing either to the right or left of street cars standing to take on or discharge passengers. Children less than seventeen years old will not be permitted to drive machines on the streets unless accompanied by a parent or guardian, and then only after they have taken an examination to determine their fitness to operate a machine.

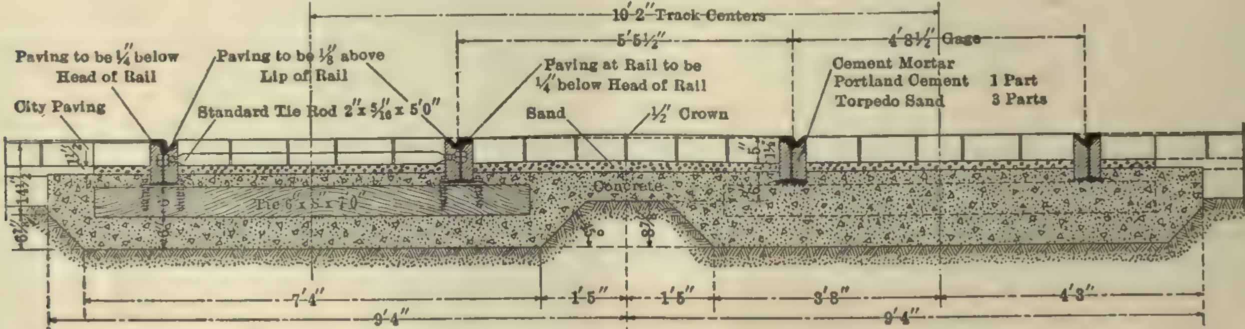
Rail Corrugation Studied in Chicago

Investigation of 72 Miles of Single Track Reveals Corrugations to Be as Prevalent on Ballast Foundations as on Concrete—Study Also Leads to the Conclusion That Curved-Head Rails Would Greatly Reduce the Rate and Amount of Corrugation

INNUMERABLE theories have been advanced setting forth the causes and remedies for rail corrugation, but so far instances have always been found which did not coincide with these theories. An article in the ELECTRIC RAILWAY JOURNAL of July 8, 1916, contributed by T. Norman Jones, Jr., chief engineer of the Virginia Railway & Power Company, Richmond, Va., indicated that corrugation was not as prevalent on a ballasted track foundation as on track laid on a concrete foundation. Since practically all of the track laid in Chicago since 1907 is about equally divided between these two types of construction, it offered a particularly fine opportunity to determine the merits of ballast and concrete foundations in their relation to rail corrugation. Accordingly, George Weston, engineer for the Board of Supervising Engineers Chicago Traction, had a survey made of 36 miles of street, or approximately 72 miles of single track, which was about equally divided between that laid on solid concrete and that laid on crushed-stone ballast. The results of this survey, which was made by C. S. Holcomb, assistant engineer, indicate that there is no particular advantage between these two types of construction in so far as providing a remedy for rail corrugation is concerned, and that corrugation is about as prevalent on one as on the other.



CHICAGO TRACK STUDIES—TYPE 2, CONSTRUCTION WITH CONCRETE IN STRINGERS UNDER RAILS



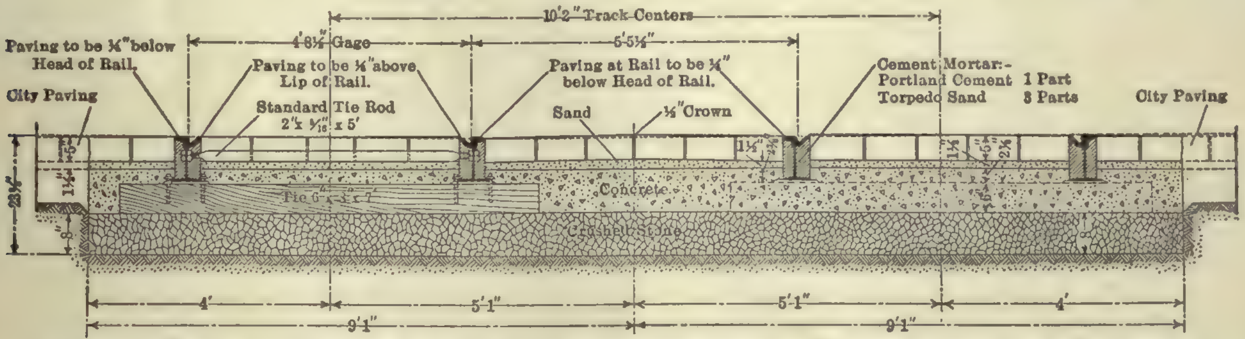
CHICAGO TRACK STUDIES—TYPE 2A, CONSTRUCTION WITH CONCRETE FOUNDATION OF UNIFORM WIDTH AND DEPTH

Two routes were selected in making this investigation, one over tracks of solid concrete foundation and the other over tracks with a crushed-stone foundation. Each route covered about 18 miles of street and contained track laid in all years from 1908 up to the present time. The location and the amount of corrugation were observed from the front platform of a car, a record being compiled en route. In selecting the two routes, every effort was made to have them as near comparable as possible, both as regards the average age and the amount of traffic. This was practically impossible, however, and, as indicated in the tabulations, the track on concrete foundations averages about one-half year older than that on the ballasted foundation, and the average traffic over the concreted track was somewhat heavier than that over the track laid on crushed stone. In other words, the conditions under which the survey was made were more favorable for the ballasted construction than for the concrete.

DISCUSSION OF DATA

It will be observed in the tabulations on page 1013 that the amount and character of corrugation was indicated in three ways in the column under the head "Conditions," namely, by the terms "None," "Trace," "Slight" and "Corrugated." The term "None" indicates that the rail either had no corrugations or they were so few and of such slight depth as to be unimportant. The term "Trace" indicates that the rail had few corrugations, usually in small stretches but of no great depth and covering not more than 3 per cent of the whole distance inspected. The term "Slight" indicates rail having corrugations usually of no great depth but covering from 3 per cent to 20 per cent of the whole distance inspected. The term "Corrugated" indicates rail having corrugations usually deep enough to be felt by the vibration of the cars running over them and extending for more than 20 per cent of the whole distance inspected.

Under the heading "Type of Track" it will be noted that two kinds of concrete track construction and one kind of ballasted construction were inspected. These three types are shown in the accompanying illustrations. Type No. 2 track construction was one of the original types adopted by the Board of Supervising Engineers, as a substitute for Type No. 1, in which steel ties were employed. In laying this type of track a trench was excavated to a depth of 19½ in. below the surface of the street and beneath the ties and the rails. Before the concrete foundation was put in place the track was lined and surfaced on blocks and wedges. From the cross-section of this track it will be observed that the concrete forms a continuous stringer beneath the rails 18 in. wide at the top and 32 in. wide at the bottom. The quantity of concrete was also reduced by simply pressing the subgrade under the ties. After two years' experience with this type of construction it was found too expensive to prepare the subgrade and the 4-ft. tie spacing did not afford sufficient bearing for the rails. Type No. 2-A, also shown in an accompanying illustration, was then developed to remedy these difficulties. In this type of construction the tie spacing was reduced to 3 ft. and the subgrade was made of a uniform width and depth, thus permitting the use of a 10-ton roller to prepare a stable subgrade to receive the concrete foundation.


10'2" Track Centers
4'8½" Gage
5'5½"
Paving to be ¼" below Head of Rail
City Paving
Paving to be ¼" above Lip of Rail.
Standard Tie Rod 2"x ⁵⁄₁₆" x 5'
Paving at Rail to be ¼" below Head of Rail.
Sand
½" Crown
Cement Mortar:- Portland Cement 1 Part Torpedo Sand 3 Parts
City Paving
Tie 6"x 8"x 7'
Concrete
Crushed Stone
23½"
8"
1½"
2⅜"
4'
5'1"
5'1"
4'
9'1"
9'1"

CHICAGO TRACK STUDIES—TYPE 3, CONSTRUCTION WITH TIES RESTING ON BALLAST ON A ROLLED SUBGRADE

Type No. 3 track construction includes a ballast foundation, as shown in one of the accompanying illustrations. This is laid in a 24-in. trench and provides 8 in. of crushed-stone ballast beneath the ties. After the subgrade has been thoroughly rolled with a 10-ton roller, the crushed stone is put in place and rolled, following which the ties are placed at 2-ft. centers and the rails laid on them. When the rail has been spiked in place the track is hand-surfaced on the ballast. All the rail used is of the Chicago standard 129-lb. grooved girder section. It rests on 6-in. x 9½-in. tie plates and

RECORD OF RAIL CONSTRUCTION ON COCRETE FOUNDATION

Street	From	To	Miles of Street	Type of Track, No.	Year Laid	Condition
12th St	Halsted St........	Paulina St........	1.1	2-A	1909	Trace
Ashland Ave..	51st St...........	39th St	1.5	2	1908	Slight
Belmont Ave..	Lincoln Ave.......	Robey St	0.5	2-A	1910	Corrugated
Belmont Ave..	Robey St..........	Western Ave......	0.5	2-A	1911	Slight
Center St.....	Clark St..........	Lincoln Ave......	0.1	2	1908	None
Clark St......	Grand Ave........	Center St.........	1.8	2	1908	Corrugated
Fullerton Ave.	Western Ave.....	Chicago River....	0.7	2-A	1910 1911	Trace
Fullerton Ave.	Chicago River.....	Clybourn Ave.....	0.3	2-A	1913	None
Fullerton Ave.	Clybourn Ave	Southport Ave....	0.3	2-A	1914	Trace
Fullerton Ave.	Southport Ave....	C., M. & St. P. R. R.	0.1	2-A	1914	Trace
Fullerton Ave.	C., M. & St. P. R. R.	Sheffield Ave......	0.3	2-A	1911	Trace
Halsted St....	Fullerton Ave.....	North Ave	1.0	2-A	1911	Slight
Halsted St....	North Ave........	Division St.......	0.5	2-A	1912	Trace
Halsted St....	Division St.......	N. Bridge........	0.2	2-A	1909	None
Halsted St ...	Chicago Ave......	Grand Ave.......	0.3	2-A	1909	Trace
Halsted St....	Lake St..........	VanBurenSt......	0.5	2	1908	Trace
Halsted St...	Van Buren St.....	12th St	0.7	2-A	1909	None
Lincoln Ave...	Center St.........	Sheffield Ave	1.2	2-A	1908	Trace
Madison St...	Paulina St........	Clinton St........	1 6	2	1908	Trace
Paulina St....	12th St...........	Madison St.......	1 0	2-A	1915	Corrugated
State St	35th St..........	18th St..........	1.9	2	1908	Slight
Wentworth Ave.......	Archer Ave.......	26th St..........	0.4	2	1908	Trace
Wentworth Ave.......	55thSt..........	59th St..........	0.5	2-A	1908	Slight
Western Ave..	Belmont Ave......	Fullerton Ave.....	1.0	2-A	1910 1913	None
Average age.	....	....	....	....	1910.5	

SUMMARY

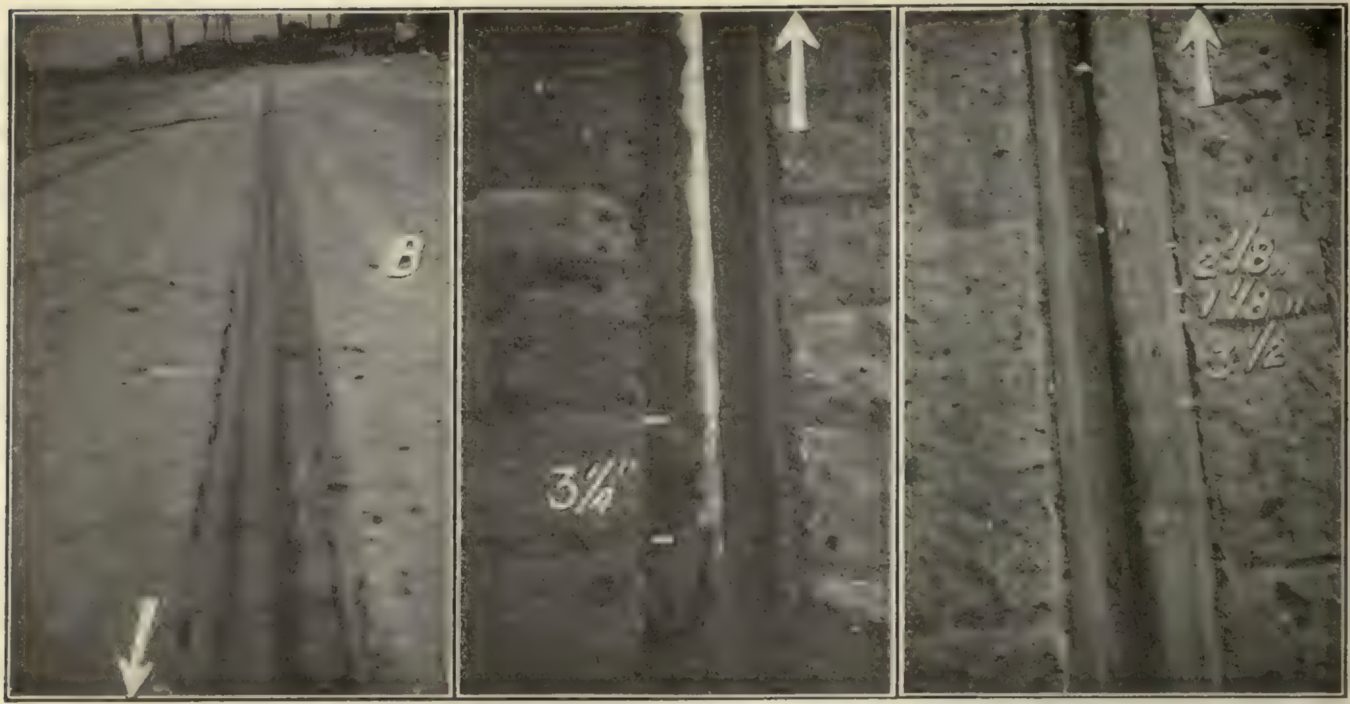
Miles of Street	Condition		Per Cent
2.3		None	12.8
7.0	Either continuous or in spots	Trace	38 9
5.4		Slight	30,0
3.3		Corrugated	18.3
Total. 18 0			100.0

RECORD OF RAIL CORRUGATION ON BALLAST FOUNDATION

Street	From	To	Miles of Street	Type of Track, No.	Year Laid	Condition
26th St.......	Wentworth Ave...	Indiana Ave......	0.5	3	1908	None
35th St.......	Ashland Ave......	W. App. to Bridge.	0.4	3	1910	None
35th St	E. App. to Bridge..	Parnell Ave.......	0.8	3	1909	None
35th St.......	Parnell Ave	Wentworth Ave...	0.4	3	1911	None
35th St.......	Wentworth Ave...	State St..........	0.3	3	1914	None
39th St	Indiana Ave......	Wentworth Ave...	0.5	3	1913	None
51st St.......	Racine Ave.......	Ashland Ave......	0.5	3	1911	Slight
59th St......	Western Ave.....	Halsted St........	1.0	3	1912	None
69th St	Halsted St.......	Racine Ave.......	0.5	3	1911	Trace
Ashland Ave..	39th St..........	35th St..........	0.5	3	1913	Trace
Clark St......	Monroe St........	Archer Ave.......	1.8	3	1909	Slight
Fullerton Ave.	Sheffield Ave.....	Halsted St........	0.3	T.V.C.	....	None
Halsted St....	N. Bridge........	S. Bridge.........	0.2	[illegible]	1909	None
Halsted St....	Grand Ave.......	Lake St..........	0.4	3	1912	Trace
Halsted St....	59th St..........	63rd Pl..........	0.6	3	1912	None
Halsted St....	63rd Pl..........	69th St..........	0.7	3	1913	Slight
Indiana Ave...	26th St..........	39th St..........	1.5	3	1911	Corrugated
Racine Ave...	69th St..........	67th St..........	0.3	T.V.C.	....	Slight
Racine Ave...	67th St..........	63rd St..........	0.5	3	1910	Trace
Racine Ave...	63rd St..........	55th St..........	1.0	3	1914	Corrugated
Racine Ave...	55th St..........	51st St..........	0.5	3	1913	None
State St......	18th St..........	12th St..........	0.6	3 Spec.	1908	None
State St......	12th St..........	Monroe St........	0.9	3	1909	Trace
Wentworth Ave.......	Archer Ave.......	26th St..........	0.5	2	1908	Trace
Wentworth Ave.......	39th St..........	Root St..........	0.3	[illegible]	1908	Slight
Wentworth Ave.......	Root St..........	55th St..........	1.7	[illegible]	1907	Slight
Average age.	....	....	....	....	1911	

SUMMARY

Miles of Street	Condition		Per Cent
6.1		None	35.5
3.3	Either continuous or in spots	Trace	19.2
5.3		Slight	30.8
2.5		Corrugated	14.5
Total. 17.2			100.0



CHICAGO TRACK STUDIES—FIGS. 1, 2 AND 3, CORRUGATED RAILS

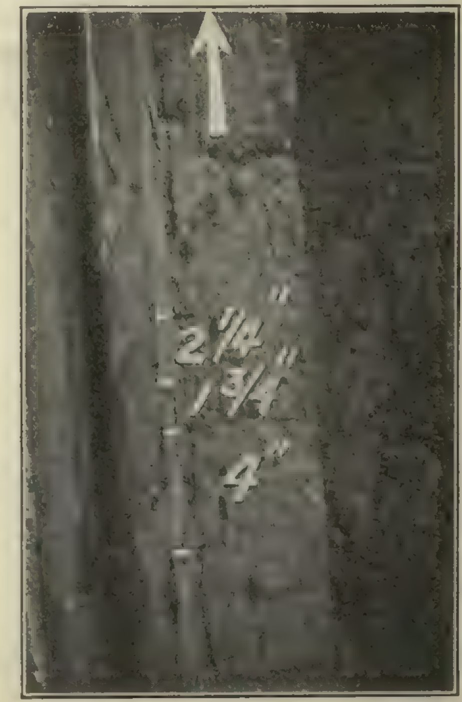
is held in place by screw spikes. The Chicago rail is a 9-in. section which is laid in 60-ft. lengths with Lorain electrically-welded joints. Tie rods, 2 in. x 5/16 in. x 5 ft. in size, spaced at 6-ft. intervals and inserted 5⅛ in. above the rail base, hold the rail to gage.

An examination of the data given as a result of this investigation for the amount and character of rail corrugation also reveals the fact that this phenomenon is not a respecter of age or conditions. For instance, much of the oldest track shows no indication of corrugation, whereas on some of that constructed much later corrugations of a maximum wave length and depth have appeared. It will also be noted that while there is more track of the ballasted type of construction having no corrugation than there is of track laid on concrete foundation, yet there is only 19.2 per cent of the ballasted track showing a trace of corrugation, whereas there is practically 40 per cent of corrugations in this stage on the track laid on the concrete foundation. Corrugations termed as "slight" and "corrugated" are in about the same amounts for both types of construction, although possibly there is slight balance in favor of the ballasted track. However, when one considers the fact that the average age of the concreted track is one-half year less than the ballasted track, and that the concreted track carries a lighter traffic, the results indicate that one type of track has very little advantage over the other in so far as corrugations are concerned.

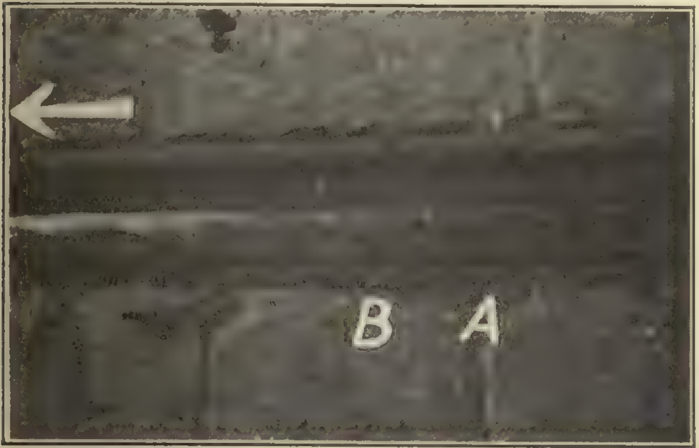
Corrugations Appeared in One Month

A further study of this phenomenon with particular reference to its appearance on rail which had been in service but a short time was made by the engineers of the Board of Supervising Engineers. One particularly aggravated case in which pronounced corrugations appeared after the track had been in service only one month was examined in great detail. This track is Type 2-A, or the concrete foundation with yellow pine ties, and it was built in April, May and June of the present year. The pavement is of granite block grouted in place, and the investigation of its condition which follows was made on Aug. 25, 1916. An inspection of this track shortly after it was placed in operation showed unusually strong indications of rail corrugation, and because of its early occurrence it was made the subject of an investigation. The track was placed in operation about July 1, so that the conditions which are described were the result of about two months of wear of 50,000-lb. double-truck cars operating on an average headway of seven minutes.

Fig. 1, shown in the accompanying illustration, is a general view of the inside rail of the eastbound track looking west. The small arrow parallel to the rail and near the border of this and other halftone illustrations indicates the direction of traffic. In this view it will be noted that just to the right of the point where the gage line meets the border of the illustration there are a number of dark areas on the head of the rail. These extend some distance back in the view. They are pronounced corrugations and are typical of those occurring on most of the rail along this street. Fig. 2 shows a short portion of this same rail on which the corrugations, due to the angle of the reflected light, show as bright areas on the head. In this illustration it will be noted that the corrugated areas are



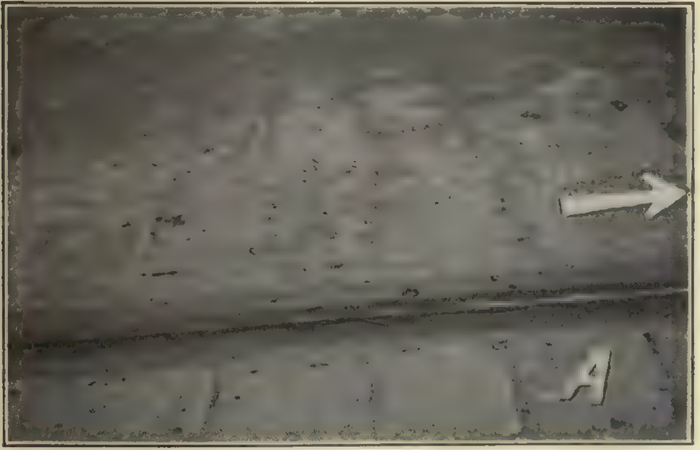
CHICAGO TRACK STUDIES—FIG. 4, CORRUGATED RAILS irregular in outline and consist of a series of small areas, each of which starts near the gage line and widens out on the head in wave-like form, returning again approximately to the gage line. Two lines were drawn across the rail at the points indicated before the view was taken. These lines were drawn at the trough or neck in the corrugated area to show the wave length, which is 3¼ in., or about the average length of the corrugations on the rail at this point.



CHICAGO TRACK STUDIES—FIG. 5, CORRUGATED RAIL

Fig. 3 illustrates a condition quite similar to that shown in Fig. 2, except that the dimensions of the corrugations are indicated in more detail. Thus the length of the lower corrugation is 3½ in., while that of the upper one is 3¼ in. It will also be noted that the distance from the trough to the crest of the upper corrugation is 1⅛ in., and that the greatest width of corrugation is not equally distant from the troughs. The distance from the crest to the trough is longer in the direction of traffic.

Fig. 4 shows a more pronounced case of corrugation than the other views. On the side of the rail head away from the gage line slight worn areas are perceptible. Lines drawn on the paving block to the right of the rail head indicate these points of wear. The length of one of these worn areas on the opposite side of the rail is 2¼ in., and the distance between the areas averages 1¾ in. This makes the average distance between the waves about 4 in. It will also be noticed that the crest of the corrugation beside the gage line is the same as the crest of the corrugation or worn area on the side of the head away from the gage line. This area of wear along the outside of the head is also perceptible in Fig. 3.



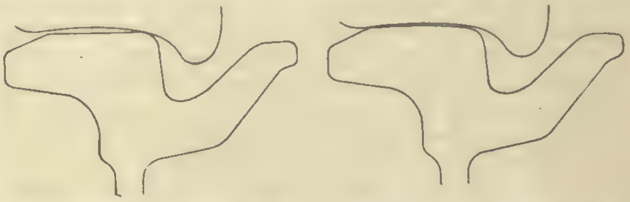
CHICAGO TRACK STUDIES—FIG. 6, CORRUGATED RAIL

Fig. 5 shows a further development in the corrugation. The crests of the corrugations on the gage side and on the outside of the head, at points marked "A" and "B," have become so pronounced that they practically meet in the center of the rail head. The small oval areas affected by corrugation appear not to receive the wheel treads as they pass over them. Fig. 5 was taken at about the point marked "B" in Fig. 1.

Fig. 6 is a view looking at the gage line and into the groove. This rail is corrugated, as may be observed by the darker portion along the gage side of the head. Just below the gage line are strips of extruded metal which appear to have been sheared off the head of the rail by the wheels. It will also be noted that there is practically no flange wear on the gage side of the throatway, and the strips that have been sheared off the head are from portions that project inside the gage line.

CONCLUSIONS DRAWN

After assembling and analyzing the foregoing data and conditions, certain conclusions were drawn regarding such pronounced rail corrugations appearing in such a short time. It is believed that the first point of bearing of the wheels on the new rails was only along the gage line. The area of contact between the rail and the wheel was such that the steel in the rail could not support the strain but was cold rolled and extruded into the groove. This cold rolling or extruding process continued until sufficient metal was removed from the gage line and its immediate vicinity to allow the outer edge of the wheel tread to come in contact with the back of the rail head. This is the condition that brought about the results shown in Figs. 4 and 5, where worn areas were observed opposite the crests of the waves in the corrugations along the gage line. The fact that as the new rail wore, two points of contact between the wheel and the rail appeared, indicated that most of the wheels passing over this track were average-worn wheels and had concave treads.



CHICAGO TRACK STUDIES—FIG. 7, CONTOURS OF AVERAGE WORN WHEEL AND RAIL—FIG. 8, SAME WHEEL ON RAIL, PROVIDING FULL CONTACT BETWEEN WHEEL AND RAIL

Fig. 7 is an average-worn wheel section placed on a standard rail-head section. The wheel section shown represents the average of twenty-four worn wheels, twelve of which had thick flanges and twelve had thin flanges. Since these twenty-four wheels were badly worn, it is possible that the section shown in Fig. 7 is rather an exaggerated condition, but in a general way it represents the average of the wheels that were operated over this track. If the section shown is accepted as representing the average-worn wheel, the two points of contact which were observed where the corrugations became pronounced can readily be explained.

EFFECT OF CURVED RAIL HEAD ON WEAR

Another point brought out in the analysis of these conditions was that the rapid rate of uniform wear or development of corrugations on this new rail represented an extreme case of the effect of operating wheels of one contour over rail of an entirely different contour. It also indicates an advantage in having a rail contour and a wheel contour which would provide a full contact which remain approximately the same throughout the life of the rail and the wheels. In the particular case cited if the rail-head contour had been a curve of long radius inclining slightly toward the gage-line side of the head, it is believed that the rate of wear would have been greatly reduced and the conditions observed perhaps much delayed. The line of contact between a rail of this kind and an average-worn wheel is shown in Fig. 8.

Uniform Wear and Corrugations on Same Track

While the conditions described in the foregoing paragraphs represent the general condition of this section of track, there were some stretches of rail, which while showing considerable wear, some along the gage line and some along the back of the rail, did not develop corrugations. Where the wear was uniform it extended back from the gage line from ½ in. to ¾ in. Wear of this kind, as well as that along the gage line and the back of the rail where it is corrugated, may be readily explained, but nothing in this investigation tends to show why the wear should be uniform along some stretches of track and corrugated in waves of from 3¼ in. to 4 in. in length in others. Observations in the field showed slightly greater signs of cold rolling on rails having considerable corrugation than was found on rails where wear appeared only along the gage line. Therefore, it appeared that the conclusion should be drawn that the greater the amount of cold rolling the greater would be the amount of corrugation. Whether this variation in the amount of cold rolling, however, is due to the differences in the composition of the rail metal, to variations in the relation of the rail heads to the wheels, to differences in the rails themselves and in the method of placing them or to some other cause was not indicated by these observations. It is also too early in the life of this rail to tell with any degree of certainty whether these corrugations will increase to such an extent as to require grinding or whether they will gradually disappear and leave a smooth running rail. In any event the conditions described as a result of this investigation may add something to the information on the subject of rail corrugation which may prove of value to others.

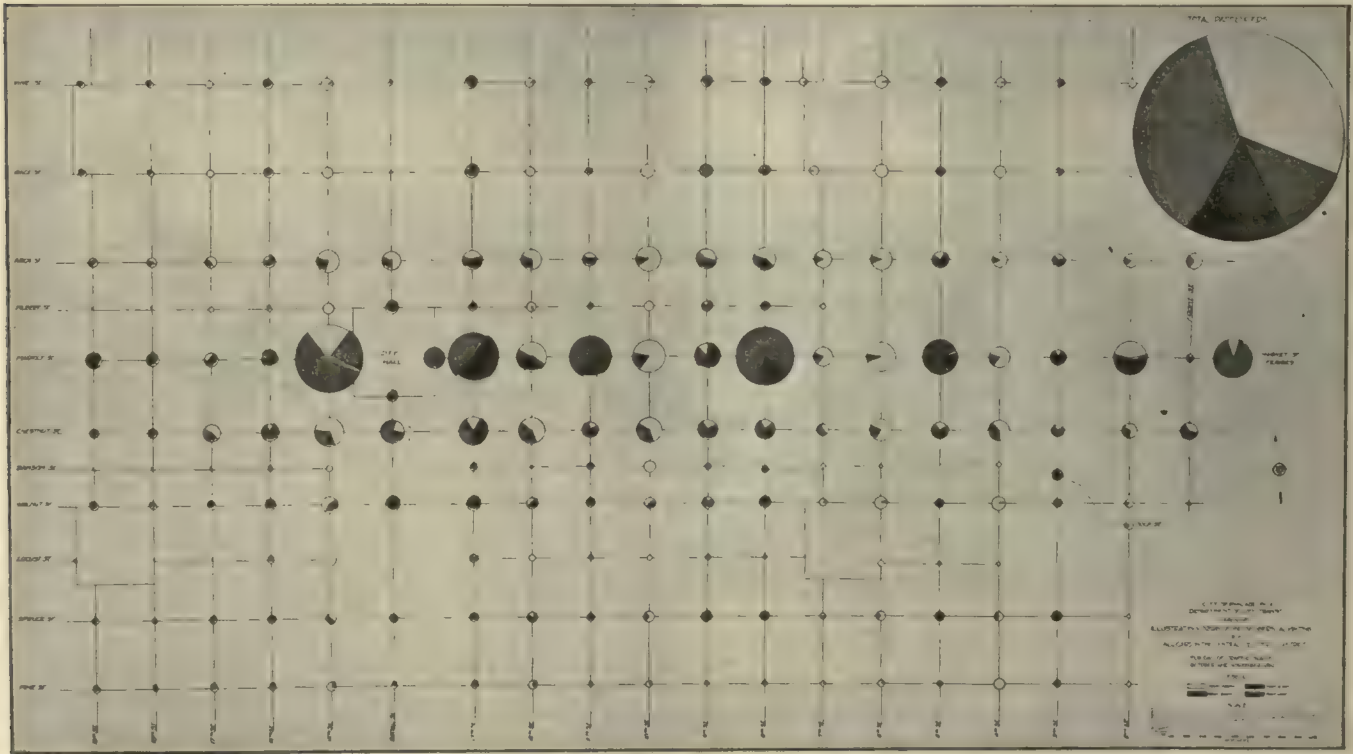
Rapid Transit Progress in Philadelphia

Department of City Transit Describes Construction Work in 1915—Deficits from Rapid Transit Operation Will Disappear About 1940

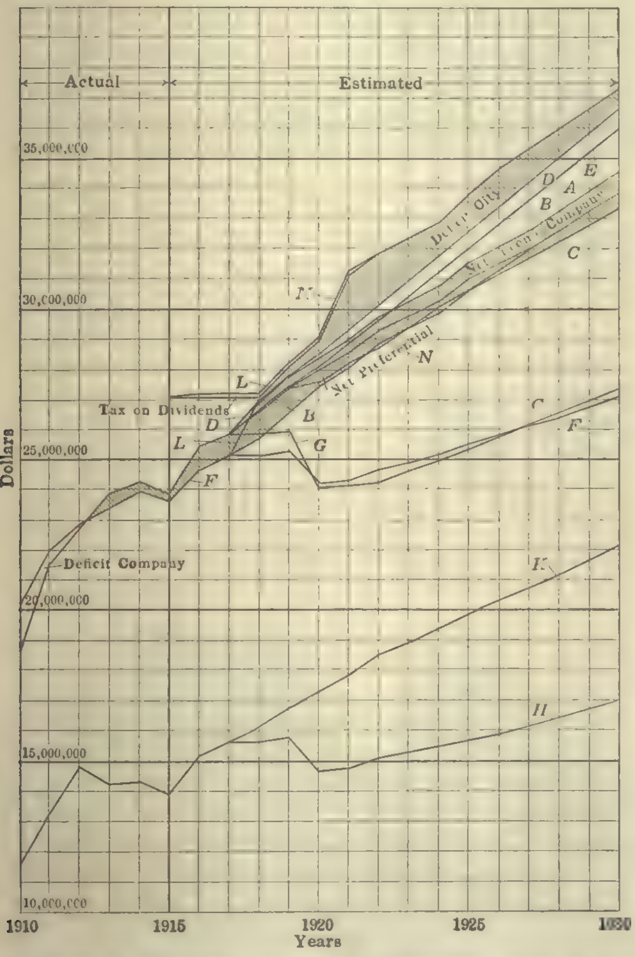
The report of the department of city transit of Philadelphia for the year ended Dec. 31, 1915, in reviewing the rapid transit situation in that city, states that since the appointment of the transit commissioners of 1912 a definite program for the construction of new lines has been evolved. The constitution and laws of the state have been amended as recommended, giving the city legal authority, financial ability and executive machinery necessary to establish a complete high-speed railway system. The city's borrowing capacity has been increased by more than $100,000,000, applicable to transit development upon most advantageous plans. The department of city transit has been organized and detailed plans for the entire system are well under way. Two of the more important lines are now under construction.

The report states that the department has discussed at length and actually reached a tentative agreement with officials of the Philadelphia Rapid Transit Company for the equipment and operation of any and all rapid transit lines which may be built by the city. Forms drawn in detail and embodying the provisions of this arrangement have been prepared by the department, although the agreement for equipment and operation has not yet been closed. It now remains only to push the construction work to completion in as rapid and efficient a manner as possible, and to close, preferably with the Philadelphia Rapid Transit Company or with an independent company, a contract or lease for the equipment and operation of the lines as constructed.

In regard to the specific work accomplished during the



TRANSIT REPORT—SPECIMEN DIAGRAM, SHOWING PASSENGER ORIGINS AND DESTINATIONS, ACCORDING TO CARDINAL POINTS OF COMPASS, AT EACH STREET CORNER IN PHILADELPHIA'S CENTRAL BUSINESS DISTRICT last calendar year, the report says that this year saw the adoption by Councils of the project of transit development and the beginning of actual work on the subway and elevated system. On Jan. 25, $500,000 was appropriated for reconstruction and relocation of sewers in and near the central business district, all but a small portion of which work was completed within the year. In March Councils called an election for the purpose of authorizing an increase in the city's debt in the amount of $6,000,000, to be devoted to the construction of the Broad Street subway and the Frankford elevated railway. The vote being affirmative, $3,000,000 was appropriated for each of these lines, contracts were let and work was begun on certain sections during the remainder of the year.



Operation by Agreement with the Philadelphia Rapid Transit Company, with Free Transfers

A—Gross income (P. R. T. Co.) plus net income from Camden Tube.
B—Gross income (P. R. T. Co.).
C—Total expenditures (P. R. T. Co.).
D—Total gross revenue (P. R. T. Co.) plus net income from Camden Tube.
E—Total gross revenue (P. R. T. Co.).
F—Total cash requirements, surface and Market only.
G—Gross revenue, surface and Market only.
H—Operating expenses and taxes, surface and Market only.
K—Total operating expenses and taxes—all lines except Camden Tube.
L—Total cash requirements.
M—Total cash requirements plus sums returned to P. R. T. Co.
N—Gross income (P. R. T. Co.) less net income from Camden Tube and net preferential.

TRANSIT REPORT—DIAGRAM, SHOWING FINANCIAL RESULTS OF OPERATION UNDER SUGGESTED PROGRAM IN PHILADELPHIA

As various plans of construction and lease have been discussed and developed thus far, estimates of the traffic, service and financial results of each to the city and the operating companies have been prepared in complete detail. In all, sixteen principal plans were under consideration during the last year, each of which is described in detail in the report of the department. Plans 1-3 embrace the system recommended by the department of city transit in its special report to Councils on Feb. 11, 1916. Plans 4-7 refer to the system authorized by Councils on June 30, 1916, under various conditions of lease. Plans 8-11 embrace the system as authorized by Councils, but including the delivery loop in the central district. Plans 12 and 13 give the estimated results of the Broad Street line alone. Plans 14-16 contemplate operation by the Philadelphia Rapid Transit Company under a suggested modification of the original program, this modification involving a recognition by the city of cash actually paid in by the Philadelphia Rapid Transit, Company and the Union Traction Company.

The estimated financial results of operation to the city of the rapid transit lines authorized by the ordinance, incorporated under the suggested plan, are fully set forth in the report. In this connection the report presents an interesting diagram, shown in the accompanying illustration, giving the financial outcome up to 1930. It is stated that the city's deficit for one year, including tax abatements for the elimination of exchange tickets, which is a maximum of $1,818,200, will disappear in about 1940. This would leave thirty profit-earning years before the expiration of the contract, after which time the city would own the entire property and equipment practically free of debt by reason of the operation of the sinking fund. As estimated on the basis of the present and past statements of the company, the minimum surplus or net income of the company applicable to the stock of the Philadelphia Rapid Transit Company is $796,790 in 1922. Under the preferential clause of the proposed plan, a surplus is to be maintained at not less than approximately $630,000. It is said, therefore, that under present expectations the abatements and credits allowed the company will be sufficient to offset the preferential payment which would otherwise be due the company.

In discussing the various plans, the report remarks that the maximum yearly deficit does not vary widely as between the various proposals, except in the case of the last three, which differ materially from all others in terms of lease and program of construction. The total deficits for the period from the beginning of operation to and including 1930 appear formidable. They are much more than offset, however, by real collateral benefits which the city receives in the way of taxes on abnormal increases in assessed valuation due to rapid transit development, from time-saving afforded by the high-speed system or from the abolition of the 3-cent exchange tickets. Moreover, the deficits represent nearly the full amount of accumulated loss from operation, as the deficits after 1930 are smaller and in most cases disappear within a few years. Thereafter in perpetuity the system should be profitable to the city in itself.

The report also includes a series of diagrams, one of which appears on page 1016, showing the results of a special study of the traffic in the central business district in Philadelphia. From the general passenger survey, made in 1912, the number of passengers boarding and alighting from cars at each street corner was compiled and plotted in graphical form. Different colors were used to indicate the proportion of passengers for travel east, west, north and south at each street corner. This information was used primarily for estimating the traffic at the stations on the recommended delivery loop. The diagrams, it is said, show conclusively that the locations recommended for the north, east and west sides of the loop will serve the greatest number of people with the greatest convenience.

Freight Locomotives for the South Shore Lines

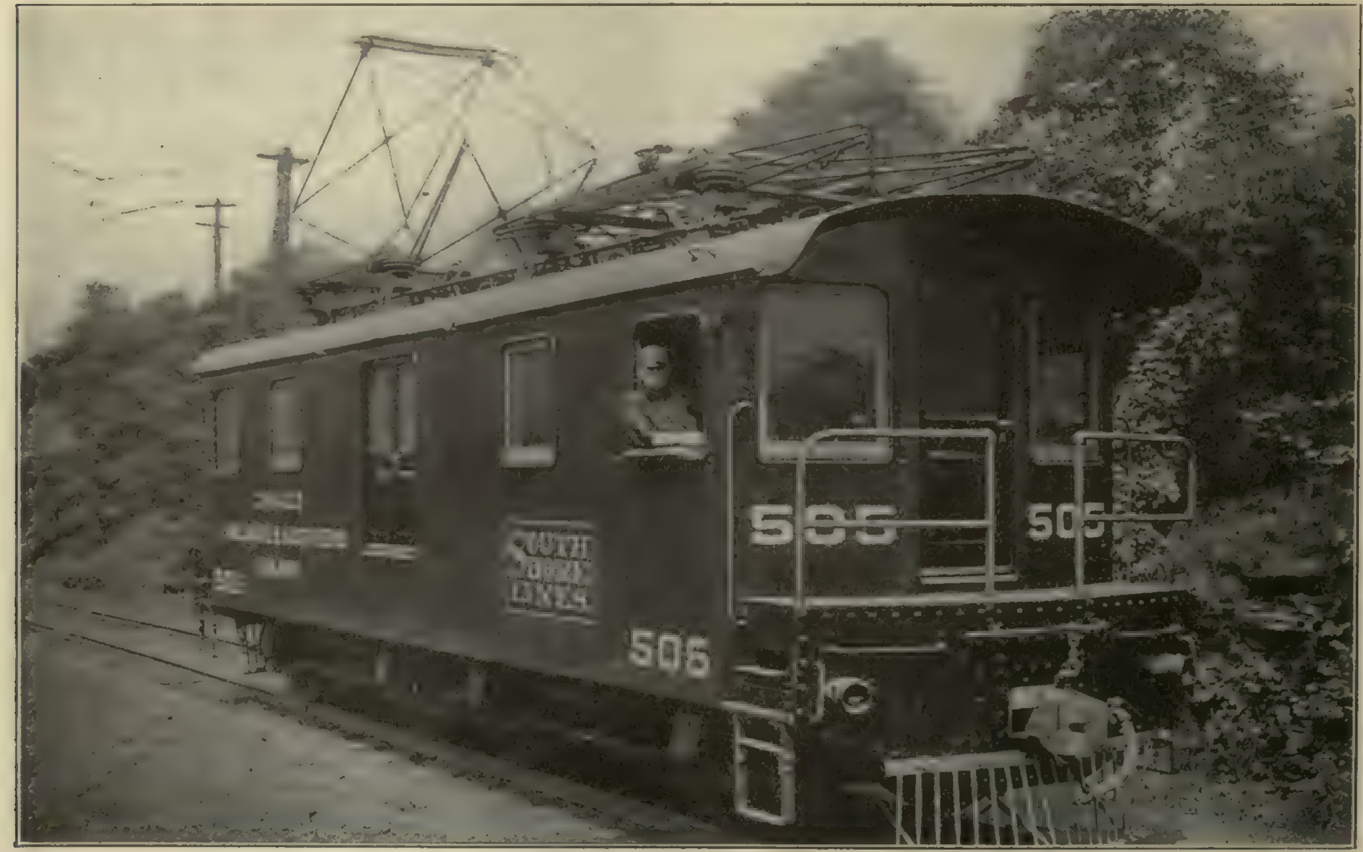
The Chicago, Lake Shore & South Bend Railway Has Recently Entered the Business of Handling Freight on a Steam Railroad Basis by Placing in Operation Two Single-Phase Locomotives Designed Especially for the Service

WITH a keen perception of the possibilities of increasing the revenue of the railroad through the handling of freight, the Chicago, Lake Shore & South Bend Railway Company has laid plans and begun activities toward the moving of this class of traffic on a large scale. The opportunities presented are most promising, considering the route of the road through the rapidly-growing district around the south shore of Lake Michigan, where construction work of interesting proportions is in progress. This involves the handling of large quantities of building material, to say nothing of the present and later possibilities for transporting the products of the industries that have been established in the vicinity.

Interchange arrangements have already been completed with the Illinois Central Railroad and the Chicago, Joliet & Eastern Railroad, and negotiations are well under way for interchange with a number of other lines. Joint tariffs have been established with some ninety steam roads, and application has been made for membership in the American Railway Association. Inasmuch as all construction and equipment on the South Shore Lines comply with standard steam railroad practice throughout, it is expected that this membership will be promptly granted. The company has already joined the Master Car Builders' Association.

No less-than-carload freight is being handled at present, but the company has purchased real estate in all the towns along its line for the location of freight houses to be built next spring, and as soon as these are ready all classes of freight will be solicited.

An entry into the freight business on so elaborate a plan naturally gave rise to the necessity for suitable motive equipment to handle heavy trains. The service was, therefore, not begun in earnest until the arrival, thirty days ago, of two new 72-ton locomotives built by the Westinghouse Electric & Manufacturing Company, and designed especially for the requirements of the road and the service. In general, these are eight-wheel, swivel-truck, 6600-volt, single-phase, four-motor locomotives, capable of exerting continuously with forced ventilation a tractive effort of 13,600 lb. at a speed of 15.8 m.p.h. with 220 volts at each motor. They will exert a tractive effort of 20,800 lb. for one hour at approximately 12.4 m.p.h., and with clean dry rails will give a momentary maximum tractive effort of 36,000 lb. A feature of the design is the mounting of all equipment, piping and conduit within the cab in easily ac-



SOUTH SHORE LOCOMOTIVES—VIEW OF LOCOMOTIVE SHOWING BOX CAB WITH SIDE DOORS

SOUTH SHORE LOCOMOTIVES—LOCOMOTIVE AND TYPICAL FREIGHT TRAIN

cessible positions, the cab having both side and end doors and being so arranged that all items of equipment can be removed without any difficulty through the doors and windows.

Locomotive Truck and Motor Equipment

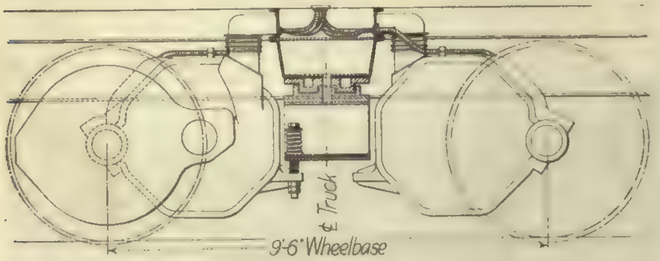
The locomotives are mounted on Baldwin locomotive-type trucks equipped with 50-in. wheels. The trucks are of the equalized, pedestal type with cast-metal side frames placed outside the wheels. These frames are similar in general design to those used in steam locomotive practice, and they are braced transversely, at each end, by a wrought-iron cross-tie, lipped over the frame and strengthened by angle irons. The springs are of the half-elliptic pattern, and are mounted directly over the journal boxes, the two springs on each side being connected by an equalizer that is fulcrumed at its middle point. Both equalizers are provided near the outer ends with coiled springs which bear against the side frames. This construction tends to reduce the severity of the shocks transmitted to the frames when passing over rough tracks. The frame pedestals are fitted with shoes and adjustable wedges, so that wear at this point can be readily taken up.

The trucks have rigid centers, and side bearings are applied to one truck only to give a three-point suspension. The rigid wheelbase is 9 ft. 6 in. and the total wheelbase of the locomotive is 24 ft. 10 in. Between truck centers the distance is 15 ft. 4 in. The motors are inside hung from two spring supports on the truck bolsters and the two axle bearings, and connected to the axles through tool steel gears and pinions, with seventy-eight and eighteen teeth respectively. The truck bolsters, like the body bolsters, are the built-up type with one-piece top and bottom members 22 in. wide.

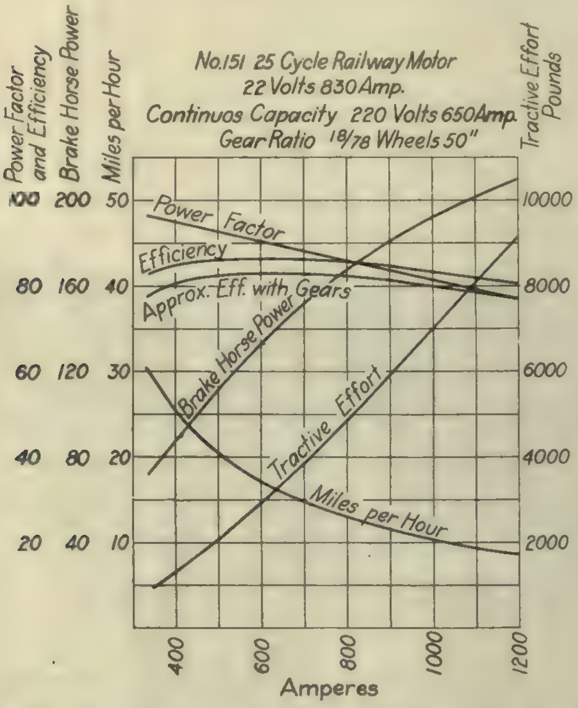
Four type Westinghouse No. 151, single-phase, 25-cycle, series motors are provided and each is capable of developing on the stand, when supplied with an air blast of 1000 cu. ft. of air per minute, 170 hp. for one hour with a temperature rise in any of the windings not to exceed 75 deg. C. above that of the entering cooling air. This rating requires 830 amp. at 220 volts When operated continuously as above without exceed-

SOUTH SHORE LOCOMOTIVES—INTERIOR VIEWS SHOWING SIDE AISLE IN CAB AND SWITCH GROUPS MOUNTED ABOVE TRANSFORMER ing the same temperature limits, the motor delivers 142 hp., requiring 650 amp. at 220 volts.

The armature windings are simple multiple coils connected to the commutator through preventive coils, and cross-connected in the armature to equalize the strength of the field in each of the several magnetic poles. The motor frames are the box type made of cast steel and as light as possible to provide the necessary mechanical strength, since they form no part of the magnetic field, which is entirely laminated. Two entirely separate sets of coils make up the field windings; one, the main field circuit for producing the effective magnetic field, and the other, an auxiliary or compensating winding which balances the armature reactance in the field. The main field windings are made up of coils of several turns of strap copper, and in general are very similar in construction to those used on the common large direct-current motors. They are held in place by clamps in such a manner that it is possible to remove them for repair without disturbing the auxiliary windings. The auxiliary windings are carried in slots in the pole faces and are short-circuited on themselves to operate inductively. This connection reduces the voltage to ground on the winding to such a low value that no grounding trouble is likely.



SOUTH SHORE LOCOMOTIVES—CROSS SECTION OF TRUCK SHOWING ARRANGEMENT FOR MOTOR SUSPENSION AND VENTILATION



SOUTH SHORE LOCOMOTIVES—CHARACTERISTIC CURVES OF MOTORS

Ventilation of the motors is supplied by an independent auxiliary motor and rotary fan which force the air through a duct built into the locomotive frame and connected to the motors at the bolsters by means of heavy canvas bellows of the customary construction.

CONTROL SYSTEM

The locomotives are equipped with Westinghouse unit switch type HB control. The 6600-volt trolley current is stepped down through a two-circuit railway type air blast transformer to a suitable potential for operating the No. 151 motors. Several taps on the secondary winding of the transformer conduct the low-voltage current to a unit switch group, from which it is conducted through a system of three preventive coils and then to the motors. These preventive coils between the various taps on the low-tension side of the transformer are provided so that the voltage may be raised or lowered on the main motors without opening the circuit. The low-tension circuits are not grounded, thus there is no short circuit in case of a ground on a motor, two grounds being required to establish a short circuit. As a precaution, the middle point of the low-tension side of the transformer is grounded through an incandescent lamp. As soon as there is a ground on the secondary side, this will cause the lamp to light. This serves as a warning to the operator to bring the locomotive to a stop and locate and remove the ground.

SOUTH SHORE LOCOMOTIVES—VIEW SHOWING SPRING-CONTROLLED MAIN EQUALIZER ON LOCOMOTIVE TRUCK

The motors are connected permanently two in series and the pairs are connected permanently in parallel. The transformer switches as well as all other unit switches in the locomotive are operated by a 20-volt control circuit taken from the ten-cell storage battery and the small motor-generator set which floats on the line, both mounted on the upper level of the framing in the center of the cab. The control circuit to the transformer switches is governed from the main drum of either master controller, located one at each end of the locomotive. These controllers are provided with ten notches, and any of the last six may be used for continuous running.

The unit switch group for the control is made up of twelve unit switches of the electro-pneumatic type, each individual switch being provided with a strong magnetic blowout to extinguish the arc whenever the switch is opened. The reversers are drum-type switches, electro-pneumatically operated by a separate lever on either master controller. The location of these various switch units in the cab is on the upper level of the steel framing in the center, where it is particularly convenient for inspection and repair. A main line switch is placed at one end of the steel framing and inserted in the short length of cable between the pantograph and transformer. This is an oil immersed switch which is hand operated and provided with an overload trip to open the switch whenever a predetermined limit in current is exceeded. It also serves to isolate completely the locomotive equipment from the trolley current, for the protection of workmen when it is necessary to work on any live part, and as an additional safeguard against the pantograph being accidentally raised.

The motorman's position is placed at the right-hand corner of the cab at both ends, looking forward, and the brake and control levers so arranged as to be within easy reach when he is hanging out the side window for switching and observing signals. The two-button block controlling the raising and lowering of the pantograph is placed just to the left of the controller, while the sander control is placed between the controller and air valve, and the bell and whistle valve at the right of the brake valves. The ammeter and air gage are mounted just to the left of the front window, and give the motorman exact knowledge of the load being placed upon the motors and the condition of the air system. A small equalizing tank in the air brake system is placed just in front of the motorman's seat, where it serves as a footrest for him. The control system also includes receptacles at each end of the cab, with circuits from the switch group leading to them through conduit for multiple-unit control, should occasion require such operation.

Both Westinghouse straight air and automatic air brake equipment is provided, and these are operated from separate control valves, one above the other, the straight air system being used in switching and handling the locomotive by itself. Air for the brakes and control system is supplied by two motor-driven geared compressors, located one at each end of the cab and controlled from the same governor. The two pumps are operated in parallel, so that both are cut in at the same time and bring up the air pressure that much faster. This arrangement equalizes the wear on the two units, although either pump will take care of the requirements in case the other is out of order. Their capacity is 50 cu. ft. of free air per minute each. As the locomotives are arranged for multiple-unit operation, a synchronizing connection is utilized in order that the load on the compressor of both locomotives will be equally distributed. The two brake cylinders are mounted, one at each end of the car underneath the pilot platforms, diagonally opposite.

MISCELLANEOUS EQUIPMENT

Two double-shoe electro-pneumatically operated pantograph trolleys are mounted on the roof of the locomotive cab. These are insulated for 6600 volts and are connected by a 6600-volt cable, which is carried in the open on porcelain insulators to eliminate the possibility of any grounds. In order that the pantograph may be raised when there is no air pressure available, a small hand pump is installed in the cab, and by setting the valve to cut off the automatic air control a few strokes of the pump handle raise the pantograph. Located between the two pantographs is a standard locomotive bell, air operated, which is controlled by a valve in the engineer's cab. The two air whistles and headlights complete the equipment on the roof of the locomotive. These headlights are a combination of a Crouse-Hinds headlight switch located within the cab over the end doors, a General Electric Company 98-volt/6-volt transformer, and Esterline Golden Glow headlight, fitted with a 500-watt lamp. The switch has a neutral, a 6-volt and a 3-volt position, the latter being used to give a dim headlight while going through cities. The headlights are equipped with an adjustable socket for readily focusing the lamp in the reflector.

The locomotives are equipped also with Sharon M.C.B. automatic couplers with slotted knuckles mounted with Westinghouse friction draft gear at each end of the locomotive, and the bumpers at both ends are fitted with poling sockets. The sand boxes at each end of the cab are equipped with Leach sanders electro-pneumatically operated and serving four spouts. A bracket mounted on the framework in the cab is located just behind the motorman's position near the top of the cab, and serves to carry all the signal and marker equipment. The locomotives are painted black outside and green inside, with brown iron colored roof and red iron color inside the hoods. A weight analysis of the various parts of the equipment is given in the accompanying table.

	Pounds
Motor	8,933
Armature	3,500
Gear case	144
Axle bearing	108
Pinion, eighteen teeth	73.5
Gear, seventy-eight teeth	911
Line switch, type 310	328
Switch group, type 267	1,120
Switch group, type 268	326
Reverser, type 284	202
Main air blast transformer	5,070
Preventive coil, 550 amp	411
Preventive coil, 355 amp	406
Controller, type 189-C	74
Storage battery	93
Motor-generator set	115
Pantograph trolley complete	1,100
Blower motor housing	122
Blower motor, type X-B-45	1,180
Blower fan	75
Air compressor, type XD-4 K, complete	2,500
Total weight locomotive, complete	144,000

Chicago Traction Report

The seventh annual report of the Board of Supervising Engineers, Chicago Traction, as of Jan. 31, 1914, has been issued. The report is very largely statistical in nature, with numerous charts and exhibits included which show the financial and operating statistics for the year 1913 and summarize the progress made in rehabilitating the street railway properties under the supervision of the board since the work began, Feb. 1, 1907. This period of seven years ended the divisional operations of the street railways by separate companies, and the report, therefore, sums up the results of the work of rehabilitation. The total cost of rehabilitating and extending the original property by actual construction or by purchase from Feb. 1, 1907, to Feb. 1, 1914, was $91,316,136 of which $84,141,583 was charged to capital account and $7,174,553 to renewal account. If this capital expenditure is added to the Traction Valuation Commission's valuation of 1906, precedent to the 1907 ordinances, the total "agreed purchase price" of the four companies under the supervision of the board is placed as of the above date, at $139,916,583. As the plans for the unified operation of the Chicago Surface Lines were consummated during the year 1913, the report also contains the full text of the unification ordinance and operating agreement. The full text of the operating agreement between the Chicago Railways and the County Traction Company is likewise included.

According to the Bureau of Railway Economics, an analysis of steam railroad statistics as of June 30, 1915, shows a total of $6,004,496,162 of capital stock in the hands of 607,630 stockholders, who comprise what may be termed the general public. This figure, it may be said, was reached after deducting 688 railways by or for whom the stock of other railways is held, and the $2,519,956,813 of stock so held. The average holding per stockholder for the United States as a whole was $9,882. The average was $7,158 in the East, $15,928 in the South, and $12,365 in the West.

Aerial Tramway at Niagara Falls

During Three Months of Operation This Novel Cableway Has Taken Its Place as a Permanent Addition to the Facilities for Viewing the Whirlpool and Rapids

THE newest attraction for tourists visiting Niagara Falls is the aerial cableway spanning the gorge in which the Whirlpool is located. Although the International Railway, Buffalo, N. Y., is in no way financially interested in the enterprise the railway is making quite a feature of advertising the attraction because the cableway is most readily reached by its lines. In fact, the cableway connects two points on the company's Belt Line on the Canadian side of the Niagara River.

The cableway permits its passengers to obtain a new view of the Whirlpool and of the river above and below the sharp bend which occurs at this point. It has been in operation since the late summer and while still comparatively unknown is already attracting a fair business. After the public has gained greater confidence in the stability of the construction the cableway cannot but become popular with tourists.

During the construction period the installation was described somewhat in the technical press. Now that it is practically complete and has been in commercial operation for some weeks a general survey of the completed installation may prove of interest, particularly in view of its relation to the local electric railway traffic.

The elements of the cableway are as follows: The 1800-ft. span of six track cables with their anchorage and tension-regulating devices; the forty-five passenger car; the traction apparatus comprising the driving motor, the traction cable and the slack-adjusting counterweight; the safety and emergency devices; the loading platforms, and the terminal stations. These elements will be described briefly in the order given.

The track cables are six in number, of crucible steel and 1 in. in diameter. The core consists of seven round strands, a smooth surface being obtained by surrounding these with a layer of locked strands. The tensile strength of each of these cables is stated to be about 92,000 lb. At one end of the cableway where the cables pass over sheaves to a tension-regulating device, a section of more flexible cable takes the place of the stiffer track cable. The working tension in each track cable is 20,000 lb.

At the Colt's Point end of the span, which may be considered the main terminal, the track cables are substantially anchored, through 2-in. steel anchor rods, in a concrete block weighing nearly 750 tons. This is embedded in the face of the cliff and is so formed that the final anchorage of the rods is in a vertical direction, the rods being bent through 90 deg. over a curved surface of large radius and separated therefrom by closely spaced I-beam supports. The rods are in chambers in which their condition can readily be inspected.

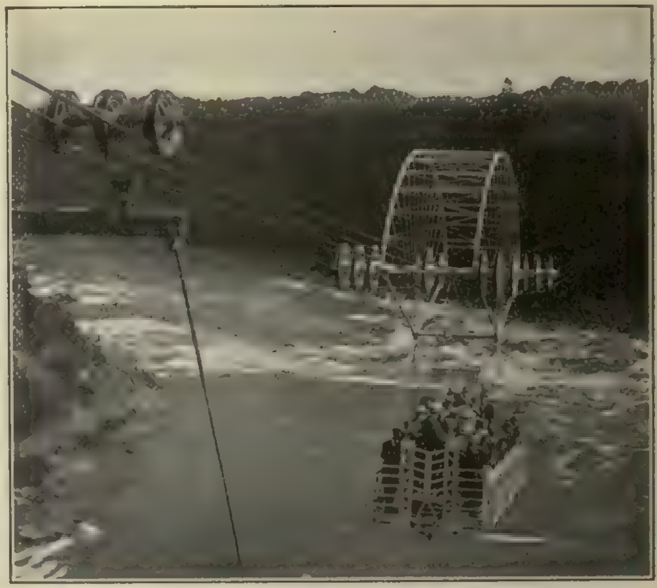
At first the track cables were connected directly to the anchor rods by means of swivel sockets. Later, to avoid any possible danger, in years to come, of crystallization of the cables at the entrance to the sockets, heavy double steel bars were inserted between the cable ends and the rod ends. This insures the concentration of angular movement, which is very slight, at the shore end of the steel bars.

At the Thompson's Point end of the span each track cable is held in tension by a 10-ton counterweight. The cable passes over a 5-ft. sheave mounted on a steel tower anchored in concrete. This device insures constant tension in the cable regardless of temperature changes and loading, the sag in the span automatically adjusting itself to maintain equilibrium of forces.

The car, which has a capacity of about forty-five passengers, is designed for lightness, grace and novelty, consistent with ample strength. It is of steel and weighs, empty, about 3½ tons. Its foreign appearance is due to the fact that it was designed and constructed in Spain. It hangs from two axles each supported on the cables by six deeply-grooved wheels 2½ ft. in diameter, the axles being spaced by means of a gracefully arched, trussed frame. Guys connect the ends of the car and the axles to prevent teetering.

The motor for driving the car is located in a chamber at Thompson's Point. It is a three-phase, 25-cycle induction motor of 75-hp. capacity. It drives the traction drum through a 30 to 1 worm gear. The ⅞-in. steel traction cable is continuous from one end of the car to the other by the following route. From one end of the car it passes over a sheave at Colt's Point and across the gorge, over a supporting sheave at the entrance to the Thompson's Point station to the driving drum. Next it passes through a tension and slack-regulating device consisting of three sheaves, to one of which a 10-ton counterweight is attached, thence back to the car.

WHIRLPOOL GORGE WITH AERIAL TRAMWAY ABOVE



CAR USED ON THE AERIAL TRAMWAY, NIAGARA FALLS, ONT.

At each end of the span is a substantial and attractive station and series of stationary platforms. The restrictions imposed by the Canadian authorities made it necessary to keep all structures below the level of the adjoining banks. Hence the terminals had to be constructed in the solid rock. Leading to the stationary platforms are light ones suspended from the track cables, so that the car actually discharges its passengers some distance out from the bank. This construction insures the proper relation of levels of car floor and landing platform.

The control of the car is in the hands of the motor operator at Thompson's Point. He operates in accordance with signals from the conductor on the car. Detailed instructions can also be given from the car by means of a telephone connection. To supplement the manual control there are several safety devices necessitated by the danger of breakage of the traction cable, the possibility of the occurrence of a gap between the car and a landing platform, etc. As the grade at the termini is about 16 per cent, substantial locking devices are essential. However, this installation has the advantage over a railway in the fact that even if the traction cable breaks the car will merely oscillate backward and forward until friction brings it to rest.

To lock the car at the end of its travel there is a clutch on the traction cable which engages with a piston in a hydraulic cylinder, furnishing also an automatic stop. This clutch is interlocked with the car gate control. At each end there are also two limit switches one of which is normally operated by the car floor, the other acting in emergency.

The aerial tramway at Niagara Falls has been erected by the Niagara Spanish Aerocar Company, Ltd., under patents of a company in Bilbao, Spain. The latter has had a smaller cableway in operation at St. Sebastian, Spain, for several years so that the new installation is in no way an experiment. The scheme of tension regulation and other features, known as the Torres system, is the invention of a well-known Spanish engineer; and the whole plant has been installed in accordance with first-class engineering practice.

AMERICAN ASSOCIATION NEWS

Mid-Year Conference Committee Meets in Boston

At the meeting of the committee on the mid-year conference held in Boston on Nov. 9 the plans for the dinner program were discussed and a number of sub-committees were appointed. Those in attendance were: C. Loomis Allen, Syracuse, N. Y.; M. C. Brush, Boston, Mass.; H. C. Clark, New York; C. P. Dennett, Boston; E. L. Janes, Boston; Myles B. Lambert, Pittsburgh, Pa.; C. C. Peirce, Boston; H. E. Reynolds, Boston; Col. T. S. Williams, Brooklyn, N. Y.

The sub-committees appointed were as follows: To secure speakers—Messrs. Brush, Williams, Dennett and Peirce; on hotel arrangements—Messrs. Dennett, Peirce and C. V. Wood, Springfield, Mass.; on seating arrangements—Messrs. Janes, Lambert, Reynolds and Clark. C. Loomis Allen was appointed chairman of the reception committee with power to name his associates. L. S. Storrs, president of the association, was named as toastmaster.

The date for the Boston dinner was definitely settled as Friday, Feb. 2, 1917, and the names of a number of speakers of national reputation were canvassed with a view to securing at least two to appear on the dinner program.

Committee on United States Mail

Henry S. Lyons, secretary Boston Elevated Railway, has been appointed chairman of the committee on compensation for carrying United States mail of the American Electric Railway Association. This appointment is of particular interest, owing to the fact that the Interstate Commerce Commission has recently announced that it would investigate the general subject of compensation for carrying United States mail.

Chicago Elevated Section Elects Officers

At the meeting of the Chicago Elevated Railroad Company section held on Oct. 24, J. H. Mallon, safety engineer, section delegate to the Atlantic City convention, gave an interesting and amusing account of his visit to Atlantic City. His talk was illustrated with slides especially prepared for the purpose by A. F. Scholz, chief claim adjuster. Charles H. Jones, general foreman electrical department, also gave a lecture on "Electrolysis," which was highly appreciated.

The secretary's report showed that there are about 200 section members in good standing.

The result of the election was as follows: President, E. J. Blair, electrical engineer; vice-president, J. A. Jarvis, superintendent Metropolitan West Side Elevated Railway; secretary and treasurer, M. Bridges, chief clerk to master mechanic; librarian, P. V. Lyon; director two-year term, J. R. McDonald, general foreman Chicago & Oak Park Elevated Railroad; director one-year term, F. Artman, service inspector Northwestern Elevated Railroad.

Connecticut Company Section

A special meeting of the section was held on Oct. 19, preceded as usual by a dinner. Seventy-two members and guests were present. The purpose of the meeting was to furnish an opportunity for the members of the section to hear reports from representatives who had attended the Atlantic City convention.

In addition to the special order, a paper on "First Aid Work, Practical Application and Scope" was read by Dr. S. L. Spier, and P. Ney Wilson, roadmaster at New Haven, read the report of the committee on snow fighting. Dr. Spier, who has conducted courses of lectures on first-aid work in co-operation with a number of utility companies, discussed treatment in the case of accidents and the results of first-aid work. The report of the snow fighting committee elicited congratulations as to its quality. Abstracts of the report are to be distributed to the several division managers and superintendents.

Manila Section

The twentieth meeting of Company Section No. 5 was held in Manila on Sept. 12, forty-seven of the 110 members being present. The secretary stated that of the 1076 employees of the railway department of the company fifty-four are members of the American Electric Railway Association.

The speaker of the evening was D. S. Cairns, assistant general manager, his subject being "Experiences and Observations on a Seven Months' Absence from Manila." He described his trip made this year through China, Korea, Japan and the United States, most of his time being spent in the last-named country. In Shanghai and Tientsin he noted particularly the popularity of the street railway service as indicated by very heavy travel. In Vancouver, B. C., his attention was attracted by the roofless cars, which were described in the issue of the ELECTRIC RAILWAY JOURNAL for Sept. 2, 1916, page 401. These, he said, seemed very popular as the climate was conducive to outdoor traveling. In his address Mr. Cairns mentioned his visits in Chicago, where he attended the N. E. L. A. convention, Minneapolis, New York and Norfolk, and elsewhere.

COMMUNICATIONS

The Jitney Bus Situation in California

California Electric Railway Association
San Francisco, Cal., Nov. 1, 1916.

To the Editors:

In California there are now 217,000 licensed automobiles, which gives this state more cars per capita than any other state in the Union. This condition is largely responsible for the fact that there are thousands of second-hand automobiles on the market available at prices within the reach of almost anyone who desires to purchase for cash or on credit. In the absence of any effective regulation in many of the cities, with the excellent condition of highways outside the limits of incorporated cities, which are open to jitney or interurban buses, and with absolutely no restriction or taxation, it is easy to see how the jitneys have gained so strong a foothold.

However, the public as a whole is beginning to realize that for their own protection something must be done, and the present jitney situation is gradually improving. Wherever the issue has been clearly drawn, that is, where the public has been called upon to decide whether the electric street car or the jitney is to have exclusive rights, the preference has always been expressed for the electric railway.

The regulation of jitney buses by local bodies has been a failure. The jitney drivers have adopted the plea of "Let the poor man earn a living," and this, as compared to the sound logic advanced by the electric railways has had its effect upon city councils and other municipal bodies—there has been a fear of being called "corporation men" which has prevented officials from carrying out regulation on a strictly fair and proper basis.

There have been a number of exceptions to this rule, and some cities are now preventing jitneys from paralleling electric lines. Long Beach, for example, has passed three separate ordinances in two years attempting to regulate jitneys. The city is now advertising an exclusive jitney franchise on streets other than those traversed by electric cars. In that city several electric lines have been abandoned because of jitney competition, but the abandoned service has not been replaced by the jitneys.

In nearly every case where a regulatory ordinance has been passed jitney men have resorted to the referendum and initiative. Doubtless this law was never intended for such a purpose, but it has lent itself well to the jitney drivers' purpose, and the result has been rather expensive to the cities in the cost of special elections.

After eight months of debate and experiment in Los Angeles, during which time jitney interests resorted to every conceivable trick to delay the ordinance, jitneys are now under the jurisdiction of the Board of Public Utilities—as are all other public utilities. This is considered a move in the right direction and fair to all concerned. In southern California generally, the public has become much more interested in fair play; legislation is being demanded, and particularly since the rainy season commenced the jitney is losing its popularity with the public.

The jitney as it exists to-day must in time disappear. The autobus is here to take its place somewhere, more than likely as a feeder to existing electric lines. Several companies are experimenting with various types of cars, and it is very likely that after the experimental stages have passed a design will develop which will be generally suitable.

Meantime—so long as independent jitneys are operated—it is essential that proper regulation and taxation of the jitney should determine just what its position as a public carrier should be. It must pay its proportion of taxation just as other public utilities do, and the public will demand this in the end. This is a question that should be adjudicated by the Railroad Commission, for it has been demonstrated that the situation cannot be adequately handled by local bodies. The rules and regulations must be uniform, and when established must be enforced. W. V. Hill, Manager.

Accounting Co-operation Desired

American Electric Railway Accountants' Association
Boston, Mass., Nov. 9, 1916.

To the Editors:

I trust you will permit me to add a word or two to the discussion started by your editorial of Oct. 14 and continued by the comments of Mr. Forse and "Accountant" in your issues of Oct. 28 and Nov. 4. On the general subject of the opinions of the certified public accountant in electric railway accounting matters, it may be stated that it is not always what is said by the outside expert that stirs a feeling of antagonism but quite often it is the way a thing is said. Moreover, it is very easy for the outside expert to assume that he knows why an account is wrong, when if he were familiar with all of the facts that may have led up to the adoption of the account he would be convinced of its correctness.

The Accountants' Committee is always willing to listen to any suggestions tending to improve the accounts and has invited criticism whenever a new system or an extended revision of an existing system has been contemplated. Before the present standard system was adopted the tentative text was sent out to all electric carriers with the request that it be carefully considered by all interested and that all who had any criticisms to make or suggestions to offer do so. It was promised that they would all be carefully considered before the final text was published. Many replies were received and every communication was gone over with great care and changes made if in the opinion of the representatives of the Interstate Commerce Commission and the members of the Accountants' Committee they would improve or clarify the system.

Wonderful strides have been made in improving the construction, equipment and operation of electric railways, all tending to make them more perfect, and it would be strange if the accounts as well could not be improved. Undoubtedly this will be done from time to time, and we hope and ask for assistance from all interested in this phase of the business.

The electric railway accountants have twice attempted to get the active co-operation of the steam railroad accountants in an endeavor to make, if possible, a system of accounts that might be used by both kinds of carriers, but I regret to say that those who represented the steam railroads gave very little consideration to the ideas of those representing the electric railways, and unless a different spirit is shown the chances of getting together are rather remote.

H. L. Wilson, Chairman of Committee,
Standard Classification of Accounts.

Some Recent Advances in

EQUIPMENT AND ITS MAINTENANCE

Tilting Rails Increases Bearing Surface—$1,800 Spent Per Car Gives Topeka (Kan.) Railway an Up-to-Date One-Man Car Equipment—Lampblack and Paint Are Effective Materials in Axle Testing

BEFORE TESTING CLEAN THE AXLE WITH GASOLINE AND PAINT IT THOROUGHLY WITH LAMPBLACK

Finding the Defects in Car Axles

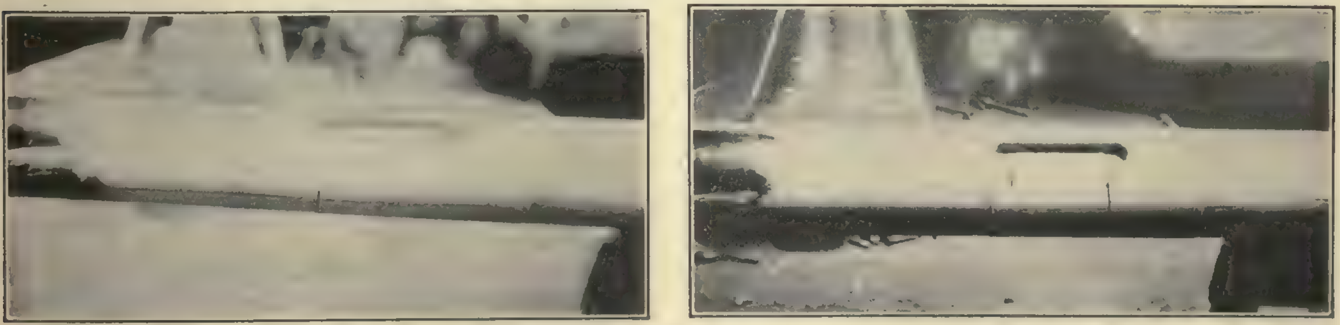
The Author Describes a Simple Method of Testing and Demonstrates the Importance of Tests for Defects When Axles Are Returned for Lighter Duty

BY R. N. HEMMING
Superintendent of Motive Power, Union Traction Company of Indiana, Anderson, Ind.

A crack, flaw or fracture in a car axle cannot be detected by sound on account of its being a solid mass. It is quite unlike a hollow pipe, a kettle, a plate or a glass drinking tumbler, which gives a flat or planky sound on being struck, if a crack exists, instead of a ring. It is also useless to attempt to find defects by sledging an axle mounted on trusses or on blocks, because the vibrations made by the hammer blow are for some peculiar reason absorbed by the supports. Trusting to this method of support during the test may result in the passing of a very defective axle as safe for service, only to be followed by a serious accident. Judging from the number of inquiries we have received in regard to safe mileage for axles, when they should be scrapped and whether or not it is possible to detect minute flaws, etc., it seems that information along this line is somewhat lacking. The following is offered as a contribution to this information. The method described has been in use for some time, and we have found it very satisfactory. The accompanying pictures illustrate the several steps in the testing process.

The axle is stripped of wheels and gears and cleaned all over with gasoline, including the keyway if there is one, in order to remove all grease and foreign substance. It is then painted with lampblack or plumbago of a medium to thin consistency. This is necessary and important as these materials will find their way into the smallest fracture. The third operation is to wipe off the lampblack or plumbago with dry waste until the axle is thoroughly cleaned all over, including the keyway. The fourth step is to paint the axle with white lead or white paint. After this it is suspended about 3 ft. above the floor by means of a rope sling attached at the balancing center. This places the axle at a convenient height for sledging and leaves both ends free. A fairly hard blow is then struck near the center of the axle, using a 10-lb. or 15-lb. sledge, the weight depending somewhat upon the size of the axle. Practice soon teaches one the size of sledge and force of blow to use, to produce the best results. With the axle suspended free to vibrate, the sledging renders visible any flaws and fractures which exist no matter how small, because the lampblack or plumbago which has been retained in the cracks or flaws shows through the white lead. The axles are carefully scrutinized all over and especially at the points adjacent to the keyway and fillets, and at that portion concealed under the wheel and gear seats.

In the last of the accompanying illustrations, there were three fractures visible, one above the keyway and two below. On the other side of the axle and opposite



WIPE OFF LAMPBLACK WITH DRY WASTE, PAINT WITH WHITE LEAD, SUSPEND FROM CENTER, STRIKE BLOW WITH SLEDGE, AND DEFECTS WILL APPEAR THROUGH WHITE PAINT these two fractures, there was another small fracture about ¼ in. long at the right side of the keyway. Fractures due to service crystallization travel around the axle and not directly through it, but their depth may vary. Five axles with defects of this type were recently discovered in a period of ten days, and practically all of the defects originated at the keyway. This is evidence that keyways should be dispensed with and that solid gears should be used in place of split gears. It also suggests the importance of considering increases in the diameters of axles at the wheel and gear seats.

A large number of our city car axles are made from worn-out interurban axles, that is, those on which the journals have become undersized and unsafe for further interurban use. These axles have generally been in use for a long period and subject to heavy stress due to the high-speed, heavy-duty service and may, therefore, be somewhat crystallized, and may contain defects which will be inherited by the city service. Turning down one of these old axles, which we may assume to have been heat treated or otherwise specially forged, gives a city axle capable of long service and effects a considerable economy. This may, however, prove to be false economy unless the axle has been thoroughly tested before turning down, and even then it should be again tested before the wheels or gears are mounted upon it. The first test should be made to avoid the expense of turning if the fracture is evident, and the second absolutely to insure its reliability before it is placed in service.

It is quite possible that these old interurban axles may be the source of some of the city car axle failures regardless of keyway or size of axle. We have had few interurban car axles break, and those which have broken have usually failed between the gear and the axle, adjacent to one or the other. The writer has no recollection or record of any axle breaking on the outside of the gear-side wheel, or on either side of the off wheel. From this it is evident that the greatest torsion of the axle is between the center of the gear and the center of the wheel next to it.

The life of an axle on the mileage basis is practically incalculable, since it is governed by the class of service, the size of the axle, the presence or absence of a keyway, the track conditions, the speed, the gear ratio, the rate of acceleration and the climatic conditions in sections of the country where extremely heavy frosts or extremely low temperatures are experienced.

Reusing Worn Trolley Wire

BY G. H. MCKELWAY,

Line Engineer Brooklyn Rapid Transit Company

In the ELECTRIC RAILWAY JOURNAL of Aug. 26, 1916, page 367, an article appeared describing some of the methods used by the line department of the city of Havana. It was stated that when the trolley wire on any of the company's lines needed repairs because of weak spots the wire was removed, carefully inspected, and those portions not badly worn were cut out and were reinstalled on lines having light traffic or in yards.

While this practice is better than throwing away good wire, especially at the present price of copper, and losing the difference in value between the scrap and new prices, yet it would seem possible to improve upon it.

A method which appears to be better is one that is now used by a number of companies of gaging the wire while it is in place and taking down only those sections which have become badly worn or burnt. This makes it unnecessary to take down any wire and later to run it again, as all wire is left in place until it is worn out. The inspection and gaging can be done as cheaply by a man on a tower wagon using a micrometer as it could be done in the yard after the wire has been taken down. It will also permit of cutting the wire to be removed into short lengths instead of taking off the ears. This will cheapen the work still further.

A few bad spots may be overlooked by this method of gaging, yet nearly all of them can be found if an occasional ear be taken off and the wire gaged at this point as well as beyond the ends of the ears.

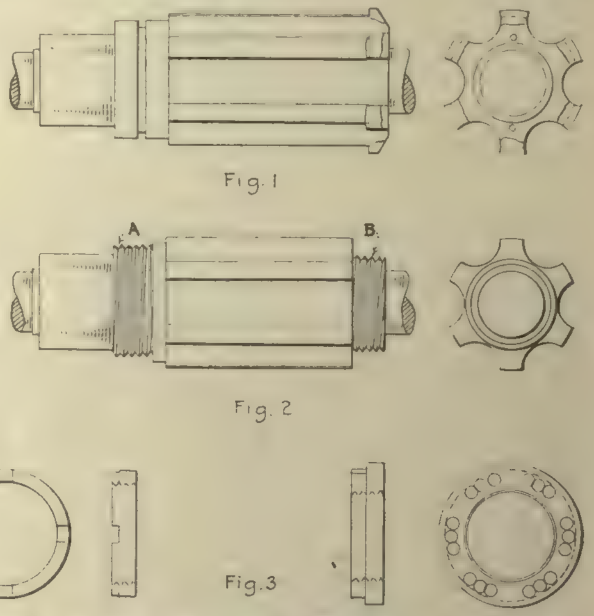
A further advantage is that the gaging permits of locating the thin places on the ground and makes easier the determination of the cause of the wear and its remedy by lining up wire, making repairs to tracks, etc.

Repair of a Motor Armature Spider

BY W. A. ERNST

Armature Winder, St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo.

A small emergency repair job was done recently in the shop of this company on a Westinghouse 112-B motor armature spider. It was noticed that the insulation on the armature coils was cut at the end of the slots and that a number of coil supports and coil guards were broken at the pinion end. Extensive end play had caused the coil guard to strike against the pinion end bearing housing, and these repeated blows broke off some of the lugs on the pinion end of the spider so that the laminations became loosened. This made it impossible to replace the coils.



METHOD OF REPAIRING MOTOR-ARMATURE SPIDER IN AN EMERGENCY

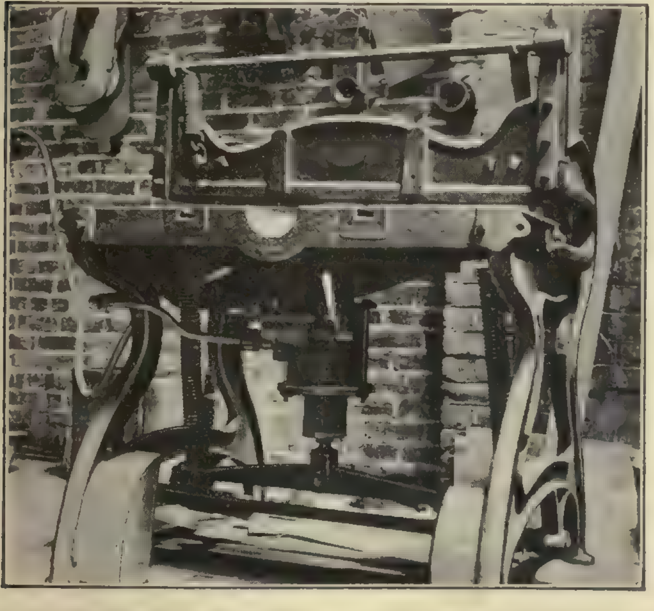
Fig. 1—Approximate shape of motor-armature spider before machining, showing broken lugs and original contour.
Fig. 2—Approximate shape after machining, *A* and *B* each having 8 U. S. threads per inch.
Fig. 3—Forged steel nut for *A*, forged steel collar for *B*; holes drilled in collar for ventilation.

On temporarily clamping the laminations together and removing them, it was found that four of the six spider lugs were broken off and the other two lugs cracked. It was not possible to weld these lugs onto the spider, as the necessary equipment was not available. Accordingly, two rings were made, one to be used on the pinion end as a collar, and the other as a nut for the commutator end of the spider. The first ring was 2 in. wide with a radial thickness of 1½ in. and an inside diameter of 1 in. smaller than the outside diameter of the spider. The other ring was 2 in. wide with a radial thickness of 1¼ in., and it was ¾ in. smaller in diameter than the armature spider. Both rings were made of mild steel. Each end of the spider was turned off and threads cut in order to take the two rings. Holes ½ in. in diameter were then drilled into the rings at each rib of the spider and a plug put in to help hold the rings. One was slightly chamfered on the end, while the other was notched for a spanner wrench, as shown. The key was then extended to its former length.

The laminations were white-leaded, and a new coil support was put on. This had been cast at a local foundry and machined at the shop. After replacing the laminations the commutator end coil support was placed in the wheel press and pressed into its former position, care being taken to have it pass over the key in the spider, a force of 40 tons being applied. The nut was screwed up tight, the pressure was released and the bolts were removed from the coil slots. The laminations were now tight, having no free movement at the bottom of coil slots as before. Five-eighth inch holes were drilled in the commutator end coil support on opposite sides, and a 7/16-in. hole through the nut into the spider. This was tapped out and a ½-in. set screw inserted. The commutator was then pressed into place, the thrust collars were replaced, the core was reinsulated, the armature was rewound and put back in service. That this was a successful method of repair is evident from the fact that at the end of six months the armature showed no signs of failure.

Air Cylinder Increases Metal Shear Capacity

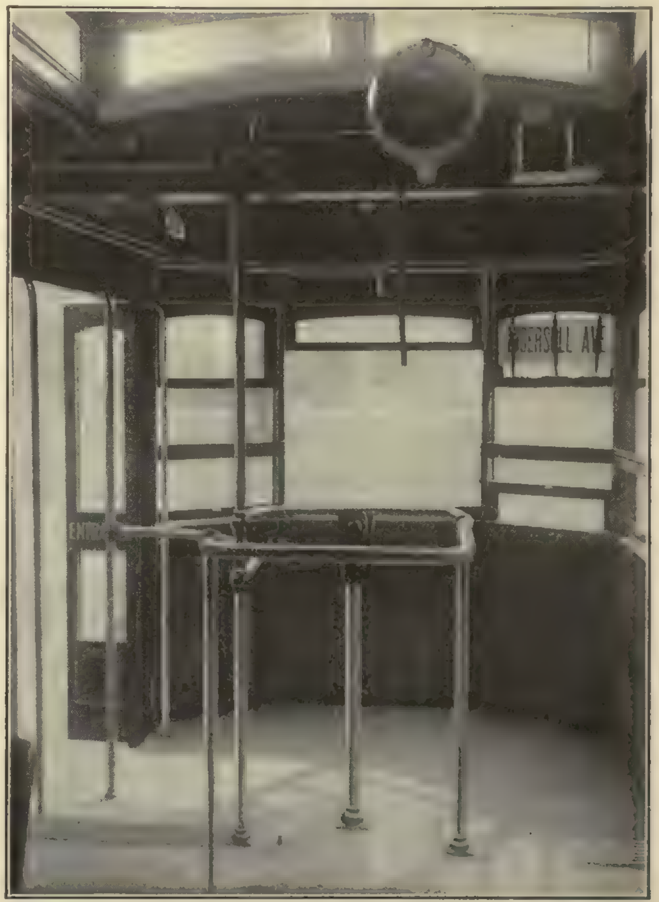
In order to increase its capacity a hand-operated metal shear has been equipped with an air cylinder and engineer's valve in the shops of the Omaha & Council Bluffs Street Railway, Omaha, Neb. As shown in the accompanying illustration, the 6-in. air cylinder has been applied on the underside of the lower blade of a Niagara Stamping & Tool Company's metal shear. Where this machine required two men to cut 18-gage metal before applying the air cylinder, one man is now able to cut 16-gage metal without difficulty and the capacity of the machine is not overtaxed.



HAND-OPERATED METAL SHEAR IN THE SHOPS OF OMAHA & COUNCIL BLUFFS STREET RAILWAY

Rebuilding Forty Old-Type Cars in Des Moines

Early this year the Des Moines (Iowa) City Railway's repair shops began remodeling forty of its old-type cars. The rebuilding of these cars, which was described and illustrated in the ELECTRIC RAILWAY JOURNAL of May 20, 1916, page 948, included removing the bulkheads, rebuilding the platforms by making them all of standard dimensions and providing a sanitary interior finish throughout the car body to facilitate cleaning.



REAR PLATFORM ARRANGEMENT OF REBUILT DES MOINES CAR

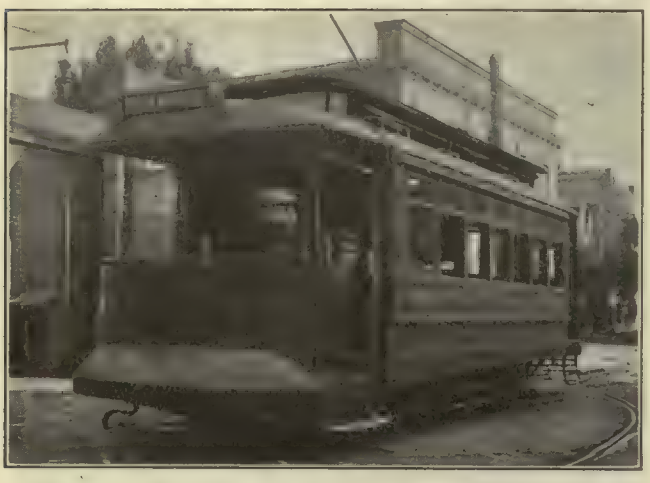
In addition to the repairs made to the car bodies, they were all repainted inside and out. The trucks were overhauled and new brake rigging provided. The worn 5-in. axles were turned down for 4¼-in. x 8-in. journals, and the motors on all the overhauled cars were geared to the second and fourth axles instead of the third and fourth.

Experience had indicated to the head of the mechanical department that the tractive effort was increased when the motors were geared to axles No. 2 and No. 4, and much of the bolster play was also obviated. In the new positions the front wheels of each truck serve as idlers and clear the rails for the motor wheels. As a part of the overhauling program the following specialties were purchased and installed: Consolidated Car Heating Company's single-stroke bells for conductors' and motormen's signals, Golden Glow headlights, National Pneumatic Company's door engine arranged for manual operation, Peacock staffless brakes and Tomlinson radial drawbars. A view of the arrangement of the rear platform of one of these rebuilt cars is shown in the accompanying illustration.

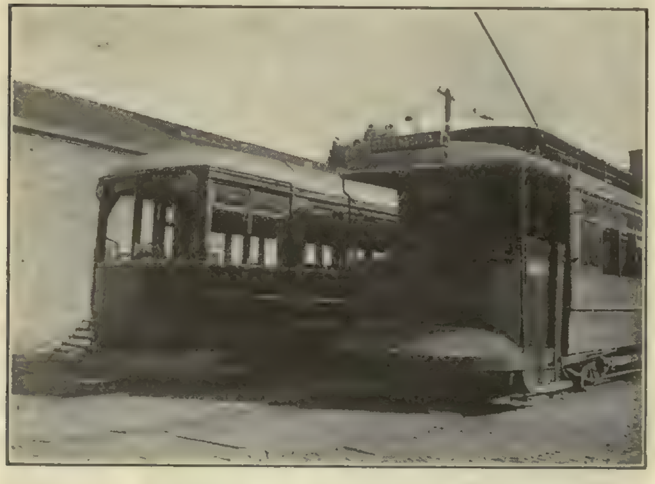
One-Man Cars Giving Unrestricted View Forward

Topeka (Kan.) Railway Is Remodeling Thirty 30-ft. Single-Truck Cars for One-Man Operation

At a cost of about $1800 per car, the Topeka (Kan.) Railway is remodeling thirty single-truck, 30-ft., double-end cars, some of which have been in use for thirteen years, for one-man operation, incorporating some of the latest ideas in the design of cars of this type. The result is an increase in seating capacity from twenty-eight to forty passengers and a reduction in weight from 22,500 lb. to 22,000 lb., the latter weight including added air-brake and air-operated door equipment.

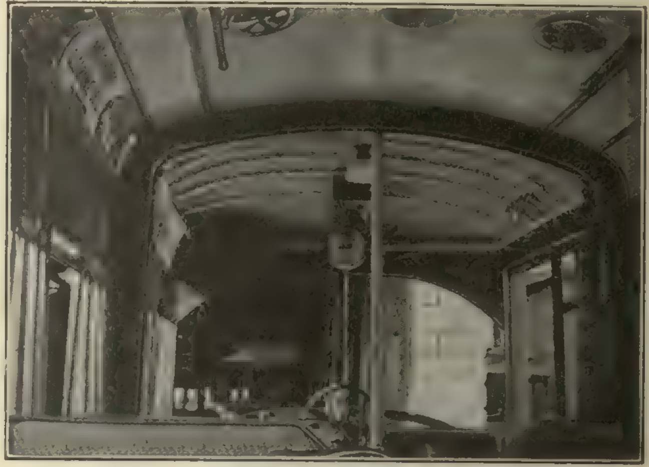

EXTERIOR OF REBUILT ONE-MAN CAR, TOPEKA (KAN.) RAILWAY

As far as appearance is concerned, one of the most radical alterations was in the roof, formerly of the monitor type. The upper deck roof was dropped by sawing off the posts supporting it and wooden blocks were filled in to give a smooth contour for the canvas covering. Steel stay rods were inserted to strengthen the roof crosswise, a steel ceiling was mounted underneath, and ventilators were placed along the sides of the roof.


AT RIGHT, REAR END OF OLD SINGLE-TRUCK CAR, TOPEKA RAILWAY; AT LEFT, SAME END OF CAR MADE THE FRONT IN REBUILDING

The interior of the car was opened up by removing the bulkheads and substituting steel channels for them. The platforms were vestibuled as shown in the illustrations, the sash being arranged to afford as unobstructed a view from the car as possible. The rear platform was brought up to the level of the car-body floor, and curved seats were installed at the rear. In front a seat for one passenger was set just inside the door and a longitudinal seat for three passengers on the platform opposite the door. The lines of the body were extended with sheet steel across the sides of the former front vestibule (now the rear of the car) and on the left-hand side of the present platform.

Thirty-inch wheels were installed in place of the former 33-in. wheels, and the trucks were set further ahead to balance the weight of the controller. Two headlamps were used, one on each side under the roof, where they are out of danger of breakage and where they throw light onto the sides of the track. With the lamps in this position the light is not blinding to automobilists and it will be convenient, if desired, to color the upper third of the lamps in such a way as to indicate routing.


INTERIOR OF FRONT OF REBUILT TOPEKA CARS

Those who have seen the cars are struck by the automobile effect of the exterior, this effect being accentuated on entering the car and looking forward. The absence of bulkheads and the low dash permit an excellent view ahead. The Topeka Railway has only one stub line, so that the operation of single-end cars is comparatively simple. A few double-end cars for this stub line are under construction.

Use of Slag-Coated Electrodes and Polarity Reversal in Electric Welding

In the discussion following the report of the committee on electric welding at the recent Chicago convention of the Association of Railway Electrical Engineers, the question arose as to the advantages of using slag-coated electrodes, and also the advantages of polarity reversal. In answer it was stated that when a slag-coated electrode is used, it is economically feasible to use a larger electrode, thereby getting excess heat and melting the metal away faster.

In this connection reference was made to a particular coated electrode on sale in this country which has an asbestos slag taped around the electrode itself. Such an electrode was described in the issue of the ELECTRIC RAILWAY JOURNAL for June 17, 1916, page 1144. The asbestos, and the clay with which it is impregnated, melt down and form a sort of glaze, covering over the electrode and protecting it against oxidation. The slag is of such a nature that the metal is absolutely clean and bright, as if it had been cut through, and there is no darkening, even on the surface of the metal.

An electrode of this kind may be used as the positive terminal. In general, however, for ordinary metal electrode work on fairly heavy sections, it was considered that better heat distribution was secured by using the electrode as the negative pole.

Tilting Rails on Steel Ties Provides Full Wheel and Rail Contact

An editorial on "Reconciling Wheel and Rail Contours" in the ELECTRIC RAILWAY JOURNAL for Sept. 2 mentioned the tilting of steel rails in Cleveland for the purpose of obtaining a full line of contact between the wheel and the plain girder rail.

The accompanying halftone of a view on Broadway, Cleveland, Ohio, shows an example of this construction with the twin steel ties of the International Steel Tie Company. The total mileage installed or on order with these ties is 10 miles. As stated in the editorial, the axis of the rail is tilted inward at a slope of 1 in 25, so that the web is at right angles to the wheel-tread slope. In order to obtain this effect it is necessary to bend the channels at a point about 15 in. from the ends. The bending points, of course, will vary with the gage and type of rail. These channels are bent in a press especially adapted for bending both ends of a pair of channels at one time.

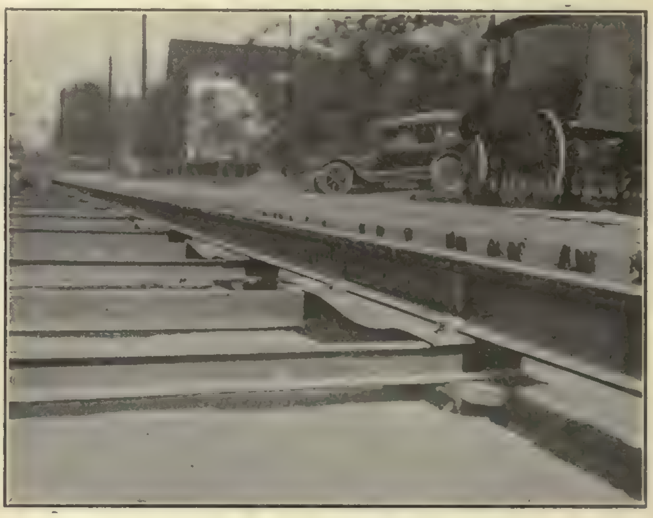
VIEW ON BROADWAY, SHOWING TEMPORARY TRACK AND CONCRETING GANG AT WORK

Another feature in connection with the track construction on Broadway is the large saving made possible by the use of the steel ties. This section of track was only ten years old and it was originally built with white oak ties in a solid concrete foundation. Both the ties and the foundation were in an excellent state of preservation, but the rail had worn out. To put new rail on these wooden ties, while practical, was not deemed advisable because they would not last as long as the rail. It was therefore decided to leave the old ties incased in the concrete and lay entirely new track. Permission was obtained from the city to raise the crown of the street paving ½ in. This permitted the use of International twin-steel ties, which are 3½ in. over all in depth, and 100 lb. A. S. C. E. rail which is 5¾ in. high. The saving thus effected included the complete concrete foundation and the labor necessary to remove the old ties. In one of the accompanying illustrations this type of track construction is shown blocked up ready for concreting.

In addition to the order from the Cleveland Railway, this company is furnishing twin ties for tilted rails to the Connecticut Company for use in 1 mile of reconstruction at New Haven and also for 1 mile by the Union Traction Company of Indiana. It is curious to note that the Cleveland Railway and the Connecticut Company arrived independently at the conclusion to use a tilted rail. In fact, the Connecticut Company had been experimenting with the use of beveled Lundie tie-plates on wooden ties for some time past.

Furthermore, while the tilted rail is a novelty in American street railway practice, it is not uncommon in the bullhead rail construction with cast-iron chairs used in England. For example, the North-Eastern Railway uses a tilt of 1 to 20 in an intersection with the Hull Tramways.

The general advantages of tilted-rail track construction are decreased wheel-flange and rail-tread wear, and the possibility of using standard plain girder or A. S. C. E. rail sections. The specific advantage of the twin type of steel tie for tilted-rail construction is that the warped plate and bent-channel combination acts like the abutments of an arch, so that a thrusting resistance is afforded against the spreading of the rails. The warped edges of the plate serve to retain the concrete absolutely and also give the plate greater vertical strength. The great bearing surface at the ends of the twin ties also give assurance that the tilted construction will not lead to a center-bound or rocking track.



VIEW OF NEW TRACK BLOCKED UP READY FOR CONCRETING

Washington Railway Spends $2,000 in Remodeling the "Columbia"

The Washington (D. C.) Railway & Electric Company has completely remodeled its private car "Columbia," and now boasts of one of the most elaborately equipped trolley cars to be found in service. The work, which was done under the direction of J. H. Stephens, superintendent, and G. E. Haar, Jr., master mechanic, was recently completed at a cost of $2,000. The car is designed for the use of the company's officials in making inspection trips over the system. It is to be utilized also by local civic organizations, who will entertain committees coming to the city for the purpose of arranging details for conventions to be held in the national capital.

The changes made consist of replacing the old-style vestibules with ones of recent design, installing new

OBSERVATION PARLOR OF PRIVATE CAR IN WASHINGTON, D. C., SHOWING ELABORATE FURNISHINGS; EXTERIOR VIEW; INTERIOR VIEW OF CAR, SHOWING BUFFET EQUIPMENT

carpet throughout, and renovating draperies, cushions and chairs. All fixtures have been finished in nickel, and the car has been repainted inside and out. A convenience room, built of mahogany to harmonize with the inside of the car, has been installed for use while the car is on suburban runs. The equipment of the car includes a water cooler, washbasin, icebox, luncheon tables and other appurtenances. Seating arrangements are provided for twenty persons, each having a roomy, comfortable willow chair.

In addition to the improvements made in the body several changes were made in the motors and trucks, the latter having new 4½-in. axles and new 34-in. steel-tired wheels. In addition new controllers and new air-brake equipment were installed. The car has also been equipped with air-operated sanders, and in addition to many changes in brake rigging, the old-type staff hand brakes have been replaced by modern staffless Peacock hand-wheel brakes.

Design for Increasing Car Capacity

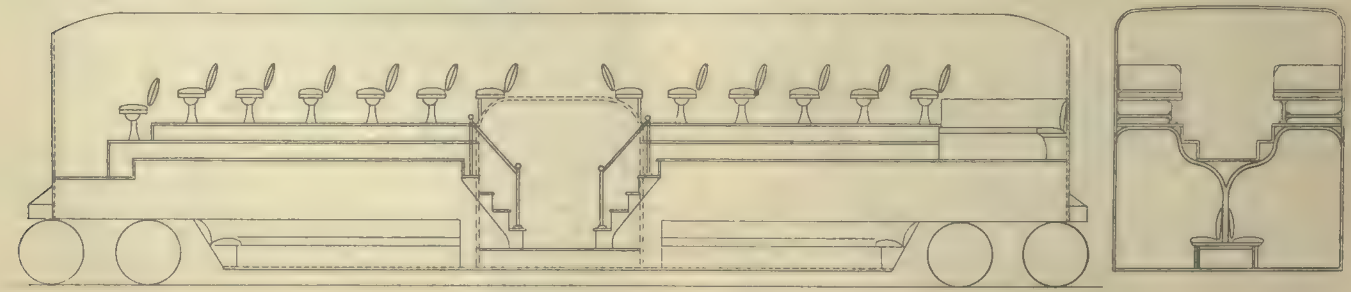
Patents have recently been issued to Fred Steffens, master mechanic, St. Joseph Railway, Light & Power Company, covering a new type of car for electric railway service. The prominent feature is the great increase in capacity which is attained by making use of a modified form of double-deck arrangement, although the design provides for galleries rather than an upper deck for the support of the elevated tier of seats. This arrangement is practically a reversal of the scheme adopted in the New York and Pittsburgh double-deck cars of three years ago, the seats on the lower deck being longitudinal and located along the center line of the car, while the upper tier of seats makes use of cross-seats located along the car sides. Access to the upper tier is attained by longitudinal steps along a central passageway, this passageway being reached by a stairway with five steps rising from a slightly elevated platform at the center portion of the lower deck.

The design calls for a length of 45 ft. over all and the total seating capacity is estimated to be ninety-eight, forty seats being provided on the lower deck while the galleries seat fifty-eight, the estimated weight per seated passenger being 400 lb. The height from top of rail to top of entrance floor is 12 in. and the height from rail to the top of the trolley board is 12 ft. 10 in., this over-all vertical dimension giving a clear height above the lower-deck aisles of 6 ft. 4 in., and a clear height of 6 ft. 8 in., above the floor of the gallery aisle.

Simple Transformer-Oil Moisture Test

While the only thorough test for suitability of oil for transformers and oil switches can be made with high-tension testing apparatus, very good indications of the presence of moisture have been obtained by J. K. Mackie, superintendent of the Connecticut Power Company, as follows: A sample of the oil to be tested is drawn from the bottom of the transformer, oil switch or storage tank. (Samples from the upper parts of the tank are not considered as suitable for the test as water is heavier than oil and usually collects at the bottom.) In the sample thus taken is placed powdered anhydrous copper sulphate. If moisture is present the copper sulphate will be dissolved, producing a blue color that will diffuse through the oil if moisture is in suspension. Since enough copper sulphate is added to insure a saturated solution, the intensity of the blue tint will be a measure of the amount of moisture present. As small percentages of moisture have a very deleterious effect on the dielectric strength of oil, however, the lightest shade of blue is sufficient indication that the oil should be dried by filtering.

It may be pointed out that other substances giving a deeper tint than copper sulphate may be used, the only requirement being that they dissolve quickly in water but not in oil.



DESIGN FOR CAR OF LARGE CAPACITY

LONDON LETTER

Review of Municipal Tramways Conference—8433 Women Conductors and 176 Women Drivers on Municipal Lines —Glasgow to Improve Car Lighting

(From Our Regular Correspondent)

In his presidential address to the annual conference of the Municipal Tramways Association, Peter Fisher, general manager of the Dundee Corporation Tramways, said that although some authorities had been considering the matter of decreasing fares, present conditions provided ample justification for suggesting that the existing low fares should be so adjusted that the increased costs would be fully met. There were 8609 women employed on tramways, 8433 as conductors and 176 as drivers. The development of tramways for good traffic was a question demanding consideration, and it was doubtful if the Government realized the assistance which the tramways could render in carrying munitions and general merchandise. The splendid manner in which women had taken up work on the tramways and the facility with which they had adapted themselves to this new employment had earned for them the approbation of the tramway authorities and the tramway patrons. The municipal tramway employees who had joined His Majesty's forces since the outbreak of the war numbered 20,905, 1893 had left tramway employment to join munition factories, £854,649 had been paid to dependents of employees serving with the forces, £43,800 had been collected on cars for national and other objects, and £36,070 had been contributed by tramway employees to various relief funds.

At the general business meeting of the Municipal Tramways Association, following the conference, the recommendation of the sub-committee of the advisory committee of the Board of Trade, that after the war all Government departments, local authorities, and statutory bodies entrusted with the control of moneys raised by taxes or rates should be under legal obligation to purchase, so far as possible, only goods produced within the Empire was discussed. The executive council of the association agreed with the principle enunciated in a resolution submitted by the council of the Incorporated Municipal Electrical Association, viewing with "deep concern" the recommendation. It was pointed out that there was no mention of Germany in the recommendation. C. J. Spencer, the secretary, asked why local authorities and similar bodies should have to buy in a restricted market if other people could buy where they liked. The executive council viewed with very grave concern any attempt to restrict the business activities of municipal tramways. An amendment to delete the paragraph from the report was lost, and the council's report was adopted. Henry Mozley, general manager of the Burnley Tramways, was elected president for the ensuing year, and J. Miles, Bolton, vice-president.

C. J. Spencer, general manager of the Bradford Tramways and honorary secretary of the Municipal Tramways Association, has compiled some statistics showing how the war has affected municipal tramway undertakings. Mr. Spencer's figures are based on returns he has obtained from eighty-eight towns throughout the country. They show, among other things, that out of a total number of employees of these eighty-eight undertakings in normal times of 55,208 no fewer than 20,805, or 38 per cent, have joined the forces of the Crown. Besides that, 1893 men have gone to munition factories. The amount paid by the local authorities concerned to dependents of tramway employees is £854,649, equal to an average allowance per man per week of 10*s.* 7½*d.* There has been collected on the cars for national and other objects a sum of £43,800, while £36,070 has been contributed by employees to relief funds. There are no fewer than 8433 women conductors. In some places, Glasgow being one of them, a few women are employed as drivers. The total number of women drivers for all the undertakings reporting is 176.

During the twelve months just ended the Birmingham Corporation tramway service has been interrupted on three or four occasions in consequence of the failure of the electric current. As it is necessary to mix poor quality coal with that of a higher standard in order to eke out the coal supply, boilers frequently fail to produce sufficient steam, and therefore it is impossible to maintain full pressure. On these occasions the officials at the power station have become aware of the low steam pressure, and there has been no alternative but to cut off the supply of electricity to the tramcars. Munition works, however, have not been interfered with, it being recognized that they have the first call upon the resources of the department.

Richmond and Kew are brought ten minutes nearer to the city of London by the new service of electric trains now running to Broad Street. The trains consist of six coaches, but three coach trains can be run in the midday hours when traffic is light. Current is supplied from the new power house at Stonebridge Park, which was built primarily for the Watford service, and will supply eventually the whole of the power required for these two branches.

The electrified portion of the London & South-Western Railway, between Waterloo and Claygate, on the new Guildford section of the line, is open for traffic. This is the last section of the line to be completed. The other sections, which have been in operation for some months past, have resulted in a considerable increase in the suburban traffic.

At a recent meeting of the Poplar Borough Council the minutes submitted by the electricity committee referred to a report by the electrical engineer on extensions required to meet existing demands. The installation of an additional 6000 kw. of capacity would cost about £76,500. As an alternative he suggests linking up with the generating station of the London County Council tramways at Greenwich, which would involve a capital expenditure by Poplar of about £8,100. It is considered that if the latter scheme were adopted it would be of advantage to both undertakings, as their respective peak loads occur at different hours. The committee expressed the opinion that it was undesirable at present to embark on the larger scheme, and negotiations with a view to the adoption of the linking-up scheme are to be continued.

The Glasgow Tramways Department has decided to improve the lighting of the cars. In view of the fact that the electric light can be switched off at a moment's notice, it is recognized that a considerable modification may be made of the drastic restrictions which have been in operation since the lighting order came into force in the spring. The present lighting restrictions have thrown a great strain on the motormen, and have hampered the conductors in collecting the fares and announcing the stopping stages. It is hoped that the better lighting of the cars will improve the general appearance of the streets without adding to the risks of aircraft attack.

M. I. Slattery has been appointed tramways manager to the West Ham Town Council in succession to J. S. D. Moffet, who is leaving to take up the management of the Belfast Corporation tramways. Mr. Slattery has held his present appointment under the London County Council for five and one-half years, prior to which he was general manager of the Oldham Corporation tramways. He has been associated with tramways during the whole of his professional career.

It is difficult at present to get new rails for tramway renewals, and much ingenuity is being used in repairing partially worn out rails so that their life may be extended. The rails on many of the tramway systems in Great Britain are not in first-class condition, so that the advent of a machine which has recently been used on several systems for grinding and deepening the grooves of rails has attracted considerable attention. In Wigan the machine of the Woods-Gilbert Rail Planer Company, London, by deepening the groove is thought to have increased the life of this track five or six years. So interested have tramway managers been in the success of this machine that the company demonstrated it recently at Bexley Heath, where grinding is under way. A number of prominent tramway managers were present and expressed appreciation of the process. The machine is of Australian extraction, and has been used on the Oldham, Ashton and Hyde tramways, and at Thanet, Cardiff and Wigan. It is fitted with transverse wheels and lifting gear to enable it to traverse clear of the track, although its weight is about ten tons. In this manner cars are allowed to pass. The machine is self-propelling and is both propelled and worked by a 50 hp. shunt motor. The grinding wheels are mounted on a separate trolley lowered onto the track by levers from the main trolley. A. C. S.

NEWS OF ELECTRIC RAILWAYS

PLEA FOR ST. LOUIS SETTLEMENT

President McCulloch Says Controversies with Utilities Have Hurt Community Development

In the October issue of the *Bulletin*, the company publication of the United Railways, St. Louis, Mo., President Richard McCulloch made a plea for an amicable settlement of disputes between the city of St. Louis and its utilities, in order that all interests might present a united front for the advancement of the community. He referred in particular to the franchise and mill tax controversies between the city and the United Railways and stated that the company would prefer to be a partner with the city rather than to be forced into the attitude of an opponent.

The detailed comments of President McCulloch were in part as follows:

"One of the obstacles to the growth and progress of this city has been the impression which has gone abroad that it is making war on its large institutions and its public utilities. This impression checks the growth of the city because no manufacturer or jobber would select for his headquarters a city having this reputation. The best asset of the city would be a hearty co-operation with its public utilities, and a national reputation for treating its large industries impartially and fairly. Prosperous enterprises, especially public utilities, would be an advertisement for St. Louis among those people who have money to invest and who are in a position to bring business to the city.

"The controversies between the city of St. Louis and the United Railways have long been advertised over the length and breadth of the land. This advertising has seriously crippled the United Railways in its financial arrangements and has undoubtedly hurt the city by keeping investors out of St. Louis.

"The controversies are two in number: First, the contention of the city as to the expiration of the street railway franchises, and, second, the litigation in connection with the collection of the mill tax by the city. It is the contention of the United Railways that all of its franchises have been extended by the St. Louis Transit and Central Traction ordinances. In the Jefferson Avenue case the company won its contention in the Circuit Court, but the matter was appealed by the city to the State Supreme Court, where it is now pending. In the mill tax case the Supreme Court decided against the company as regards the tax prior to 1910, and in June of this year the company paid to the city $1,839,205. The payment of the tax since 1910, amounting with interest to about $1,500,000, is still in litigation. The immediate payment of this additional large sum would seriously cripple the finances of the company, while the attack on the duration of its franchises puts a stop to all further improvements or extensions until a final court ruling is obtained.

"Would it not be a happy step in the line of progress for the city of St. Louis and the United Railways to get together, formulate an amicable settlement of these differences, clear them up at once and remove the pall which hangs over the property of the company? Would it not be better for the city to have a prosperous and flourishing street railway which would be financially able to keep abreast of the most recent progress in the art, which would be able to maintain its reputation of furnishing the best surface transportation in this country, and which would be a matter of pride to the citizens of St. Louis? Even if the city were eventually able to win all of its contentions and enforce its demand for its full "pound of flesh," would it be to the credit or advantage of the city to have forced its greatest public utility to the wall?

"The United Railways has from 5000 to 6000 employees and perhaps as many investors in its securities living here in the city. These with their families represent a substantial percentage of the population. The settlement of these controversies is a matter in which each one of them is vitally interested. A prosperous street railway is able to do much more for the city and much more for its employees than one which is financially crippled. If the company is to progress, it should not be loaded with burdens. It would prefer to be a partner with the city rather than to be forced into the attitude of an opponent."

The United Railways, through its attorney, Henry S. Priest, has sent a letter to City Counselor Daues, urging the calling of a conference between committees representing the company and the city, to discuss a plan for the adjustment of the mill tax and the question of the duration of its franchise and those of its constituent companies. He stated that with bonds of underlying companies maturing lack of surplus earnings would prevent their being paid out of income and that new bonds could be disposed of only under conditions unfavorable to the company.

PRESIDENT WILLIAMS ON THE FUTURE

Head of Brooklyn Rapid Transit Predicts Moving Platforms and Automobile Feeders for Transit

Col. Timothy S. Williams, president of the Brooklyn (N. Y.) Rapid Transit Company, was a contributor to a symposium in the seventy-fifth anniversary number of the Brooklyn *Daily Eagle* published Oct. 26, on changes likely to be brought about in the next seventy-five years. His contribution follows in full:

"Seventy-five years is a long period to look ahead in these days, and, of course, it is impossible to make any accurate predictions of what that period of years will show in the way of improvements in local transportation. In order to get a line on the future we naturally turn to the past, and find that during seventy-five years the whole system of urban transportation facilities has developed. For sixty years of this period transportation has been by cars operated on rails, and I imagine that this fundamental condition will not change for at least the next seventy-five years.

"The new railroad structures that are now building, both underground and overhead, would be a waste of money if they do not last at least fifty years, and the subway structures particularly ought to have an indefinite life. There undoubtedly will be changes in the equipment, and quite possibly in the motive power.

"On some lines there possibly will be continuous movement, like that which we have seen occasionally on a small scale in so-called moving platforms. I have heard competent railroad men predict that the street surface railroads would in a comparatively few years become obsolete. This I doubt. Of course, they will cease to be useful for long distances in cities, but the increasing density of population will require some facility for moving vast numbers of people short distances, and I do not see how this can be accomplished otherwise than by the continued operation of large vehicles on tracks.

"At the same time I think we will see in the next twenty-five years at least comparatively few extensions of street surface railroad tracks. This is because of the restrictions now imposed upon their construction in our city, and the impossibility of making their operation profitable in view of these restrictions, the original cost and the small return. In many outlying sections their place will be filled by self-propelled vehicles acting as feeders.

"Flying machines will undoubtedly become an important factor in carrying passengers, mail and small packages over considerable distances, but I hardly see how they can be of much practical use in local urban transportation.

"We are likely to see some radical changes in the conduct of vehicle and car operation on public streets. Regard for safety is likely to make necessary the setting aside of particular parts of our thoroughfares for pedestrians, pleasure vehicles, commercial vehicles and passenger cars, respectively. All cannot continue to be mixed up indiscriminately as they are at the present time."

DALLAS ELECTION GOES OVER

Failure to Agree on Details of Proposed Contract Makes Postponement Necessary

Negotiations by which it is proposed that both the railway and the lighting utilities of Dallas, Tex., shall be reorganized and taken over by the new companies headed by J. F. Strickland and C. W. Hobson are at a standstill, pending the receipt of the properly executed lease agreement by which the proposed new railway will take over and operate the Oak Cliff street car lines of the Northern Texas Traction Company. Reports from New York, where this lease is being drawn and executed, state that a hitch has developed over minor details, but that these are expected to be settled in a short time and the papers forwarded to Dallas.

The proposed straw vote on the question of permitting a valuation of $8,500,000 for the traction properties, instead of the valuation of $7,100,000 fixed by E. W. Bemis after a survey of the properties, is being held in abeyance pending the settlement of the lease question.

The drafting of the proposed new franchises, which are to be passed by the City Commission, instead of the two model "service-at-cost" franchises approved by the voters of Dallas at the election last April, is going forward in the city's legal department. It is learned that the "service-at-cost" feature will be the basic principle in these franchises, but that several features not included in the model franchises approved by the voters last April will also be included. Originally it was provided that at the end of ten years the city might take over the properties at their actual cash value, plus a small percentage, and at the end of twenty years either the city or some other interest might be privileged to buy them under certain conditions. In the new franchises a provision is inserted under which the properties may be taken over by the city or by any other interest designated by the city at any time. This transaction may be by purchase outright, or on another basis than a cash transaction, by assuming the outstanding obligations in bonds up to the amount of value recognized by the people of Dallas. This adds a means by which the city may acquire the properties without payment of cash.

Mayor Lindsley, in discussing the new features of the ordinances, explained that they were being drafted with two objects kept constantly in view. One is the proper protection to legitimate capital investments in Dallas, and the other the proper protection of the people of Dallas through rate and service requirements.

ATTEMPT AT STRIKE IN JACKSONVILLE, FLA.

An attempt was made on Oct. 21 to provoke a strike of the employees of the Jacksonville (Fla.) Traction Company. Only nine of the 244 employees responded to the call. As soon as the public officials learned that there was likelihood that some of the men would go out, Mayor Bowden issued a statement to the public in which he said:

"No rowdyism, jeering of trainmen, gathering in crowds or other disorder of any character will be tolerated. The police have received positive orders to this effect. Any person attempting any character of disorder will do so at his peril. The law will be upheld and order maintained."

The day after the men went out, Chief of Police Roach made a statement to the newspapers in which he said in part:

"There is nothing unusual as far as I can see. The people rode the street cars and the employees who desired to work did so. There were no cases of disorder, except three, in which arrests were promptly made. There were no fights or hostile gatherings. You may say for me, however, that any man, regardless of who he is, who starts any trouble, is going to have a hard time. Fewer arrests were made last night than have been made during any Saturday night for months. There is absolutely no occasion for excitement on the part of the people."

The places of the men who went out were filled promptly and the interruption to traffic was confined to filling the places of the few men who deserted their cars on the streets. These cars were manned after only a few minutes' delay, by employees transported in automobiles to the scenes of the desertions.

IMPORTANT RAPID TRANSIT LINK OPENED

The Public Service Commission for the First District of New York directed the Interborough Rapid Transit Company to begin service on the Ely Avenue extension of the Queensboro Subway from Hunter's Point Avenue station in Queens north to the new Queensboro Bridge Plaza station on Nov. 5 at noon. This provides the first through rapid transit link between the new $500,000 station on the Queensboro Bridge Plaza and Park Avenue and Forty-second Street, Manhattan. The order to begin service was made following an inspection of the new line by Commissioner Henry W. Hodge, engineer of the commission and representatives of the Interborough Company. The Queensboro subway is one of the most important links in the new dual system of rapid transit. Ultimately it will be extended west from Park Avenue, Manhattan, its present western terminus, to Times Square. At the Bridge Plaza station in Queens it connects with the important Astoria and Corona elevated extensions, which are being pushed to completion and which should be in operation within the next few months. When these lines are completed it will be possible for a passenger from any point on them to travel to the furthest limits of the Interborough lines in the Bronx, Manhattan or Brooklyn for a 5-cent fare. The Queensboro subway was begun several years ago and was earlier known as the Steinway tunnel. It was turned over to the city as a part of the pool of the lines under the dual subway arrangement, and now forms a part of the city's subway system operated by the Interborough Rapid Transit Company. The Bridge Plaza station in Queens has been described as probably the largest elevated station in the world. It is 480 ft. long, 90 ft. wide, and above the street level has a mezzanine and two levels of tracks. Four express tracks and four local tracks will pass through the station, providing accommodation at one time for four ten-car trains of the present 52-ft. Interborough cars, and four eight-car trains of the new 67-ft. cars purchased for the new operation under the dual system by the New York Municipal Railway Corporation.

SAN FRANCISCO CONSIDERING PURCHASE OF UNITED RAILROADS

Would Settle Question of Municipal Railway Extensions and Afford Transfer Privileges—City Could Not Issue Bonds

M. M. O'Shaughnessy, city engineer of San Francisco, Cal., is preparing a report to be submitted to the Board of Supervisors in the near future which will discuss the problems involved in the taking over of the United Railroads' system by the municipality. Perhaps the most urgent railway problem up for settlement is the question of the city's right to operate on upper Market Street. This matter is now pending in court. Meantime, on the completion of the Twin Peaks Tunnel the development of the 5000-acre tract which this tunnel is expected to open up will be delayed and the investment in the Church Street branch line will be deteriorating without having ever rendered service to the expectant residents of that district. Other problems are also involved in additional extensions which the municipality is desirous of making and in the absence of transfer exchange privileges between the municipal lines and the United Railroads. Transfer privileges are being demanded by residents of the North Beach, Golden Gate Valley and other districts where the use of both systems is desirable.

Mr. O'Shaughnessy's report is expected to point out that the United Railroads reorganization plan which has reduced the capitalization about one half has brought the system within the city's purchasing power, and that careful examination, taking into account the original outlay, probable final cost, interest on sinking fund, and depreciation, warrants the conclusion that the city could operate the system within its earning power. The operating revenues in 1915 were about $8,000,000 and in 1916 about $7,750,000. It has been made clear, however, that the success of any plan for purchasing the United Railroads depends primarily upon the possibility of financing it without putting through a bond issue. This is because the city will be close to its legal limit of 15 per cent of assessed valuation upon the issue of the Spring Valley bonds, assuming that the administration will later be successful on this issue.

ARRESTS MADE IN SUBWAY DYNAMITING CASE

Six men were arrested on Nov. 3 and accused by the police of New York of having been in a conspiracy to blow up subway stations in an effort to force a settlement of the street railway strike that would be favorable to the strikers. The short affidavit prepared at the direction of District Attorney Swann preparatory to the arraignment of the prisoners before a magistrate charged specifically that all of the prisoners, either directly or indirectly, were concerned in the placing of a dynamite bomb which exploded with disastrous results in the subway station at Lenox Avenue and 110th Street early on the morning of Oct. 24, referred to in the Electric Railway Journal of Oct. 28, page 947. Four of the six men arrested are said to be officials of Local No. 731 of the Amalgamated Association. The prisoners were committed to jail, in default of $20,000 bail each, for further examination. The cases of the men were set for hearing on Nov. 8, but the court put the matter over until Nov. 10, despite the protest of Louis Fridiger, representing the accused men.

Captain Tunney of the New York police bomb squad is reported to have said in an interview in which he described how the plotters had been apprehended:

"Merna confessed it was his plan to dynamite the Times Square or Fifty-ninth Street subway station this morning at 4 o'clock. Merna said to me, 'Why, I'm perfectly willing to give up my life to help these 11,000 strikers.' He said to me, 'I didn't want to kill anybody. At 110th Street we waited until two trains had passed so as to keep from blowing one up.'

"They admitted that all the money they used, $190, had come from the public. You know how strikers have been going around town playing hand organs and begging. They said they got $60, $70 and sometimes $80 a day in small contributions."

FATAL DRAWBRIDGE ACCIDENT AT BOSTON

About forty-seven passengers on a surface car of the Boston (Mass.) Elevated Railway were drowned on the evening of Nov. 7 when the motorman failed to stop before the open draw of the Summer Street bridge over the Fort Point Channel, the car being precipitated into the water from the easterly side of the inlet. The car was a double-truck equipment with a 25-ft. body and hand brakes. The seating capacity was thirty-four. It had longitudinal seats, was of the box type, and had been inspected and found in perfect operating condition less than three hours before the accident. The car left the P Street carhouse in South Boston at 5.13 p. m. inward-bound for the city proper, and carried between fifty-five and sixty passengers as it approached the drawbridge. The motorman escaped injury by jumping from the front vestibule before the car struck the water. He stated that he made a regular stop about 75 ft. east of the draw; that as he approached the latter he noticed the arc lamp at the easterly end of the bridge was not lighted, and that he did not see the gates or the red lantern usually hung on the latter. The car broke through the gates and, with the car body and forward truck, fell into the channel, leaving the rear truck on the bridge. About twelve passengers, besides the motorman and conductor, were rescued, the remainder meeting their deaths under water.

Matthew C. Brush, president of the Boston Elevated Railway, arrived on the scene shortly after the accident and, in co-operation with Mayor Curley of Boston and other city officials, the Boston Fire Department, harbor craft, police, naval officers and wrecking concerns, everything possible was done to reclaim the victims. As the car fell into the water, which is about 30 ft. deep at this point, it turned completely around and remained upright, facing South Boston. Several passengers escaped through the doors and windows after the plunge and were rescued soon after reaching the surface. During the night divers attached to the staffs of the Scott Wrecking Company, New London, Conn., and of the Hugh Nawn Contracting Company, Boston, cleared the submerged car of victims, and at 3 a. m. on Nov. 8 the car was raised to the surface by lighter chains and removed to the South Boston yard of the railway company, where it was subjected to an official examination by the Inspection Department of the Massachusetts Public Service Commission, the police authorities and officials of the company.

The drawtenders asserted that the lighting conditions were normal at the time of the accident. The gates were closed, one being bent backward out of shape by the passage of the car. The track was in first-class condition, and no trees are located in the district. The motorman, 25 years of age, had been in the employ of the company since June of the present year. The wheels of the rear truck, which remained on the street, were all found to be worn flat by the brake application before the car went over the end of the bridge. The motorman was arrested on the charge of manslaughter and was committed pending investigation. Although no official finding had been reached on Nov. 8, the evidence at that time pointed to failure of the human element in control of the car to observe the usual precautions in approaching the bridge. The disaster is the most serious one in the history of the company, which has been a pioneer in the "Safety First" movement and has constantly endeavored not to be excelled in the field of careful operation by any other electric transportation system.

CHICAGO ALDERMEN ON EASTERN TRIP

Robert Ridgway and W. B. Parsons, eastern members of the Chicago Traction & Subway Commission, arrived in Chicago Wednesday morning, Nov. 8, and with Bion J. Arnold, the Chicago member, are in conference in that city. Thursday morning sixteen Aldermen, members of the City Council local transportation committee, left for a tour of several eastern cities for the purpose of studying the subways under operation and construction, and to be better prepared to receive the report of the subway commission. In Philadelphia the aldermen expect to confer with T. E. Mitten, chairman of the executive committee and president of the Philadelphia Rapid Transit Company, and W. S. Twining, city transit commissioner. At Boston Prof. George F. Swain, Boston transit commissioner, and M. C. Brush, president of the Boston Elevated Railway, will conduct the party on the inspection of the Boston subways. In New York Frank Hedley, vice-president and general manager of the Interborough Rapid Transit Company, and T. S. Williams, president of the Brooklyn Rapid Transit Company, will conduct the members on an inspection tour of the subways completed and those under construction as well. On the return trip the aldermen plan to stop at Cleveland, where J. J. Stanley, president of the Cleveland Railway, and Fielder Sanders, city transit commissioner, will meet them.

NEW PLAN FOR CLEVELAND RAPID TRANSIT LINE

In a letter to the City Council on Nov. 6, W. R. Hopkins, president of the Cleveland Rapid Transit Railway, stated that the former plan for financing the proposition had been dropped and that an entirely new one had been taken up, with excellent prospects of success. The greatest drawback to pushing the work was the greatly increased cost of construction since the franchise was granted. Mr. Hopkins said that the cost of building the first lines would be $3,000,000 above the estimates made when the franchise was granted, but that it was his opinion that the proposition would be able to carry this increased burden, if necessary. He said the company was pushing forward the new plan of financing. Mayor Harry L. Davis stated that, if the company would give the details of the new plan and assure the city of its intention to go forward with the work, he would probably be in favor of extending the franchise, but that the letter received does not contain the information needed. The franchise provides that at least $500,000 shall be spent on construction by Feb. 1, 1917.

Electrification from Stone Harbor to Ocean City Discussed.—Electrification of the Pennsylvania Railroad from Ocean City to Stone Harbor and extension of the line to Cape May were discussed recently between officials of the railroad and representatives of the county and coast resort governments and Chamber of Commerce at Stone Harbor, N. J.

Third Cleveland Power Arbitrator Selected.—Judge John M. Killits of the United States District Court, on Nov. 1, appointed A. F. Ingersoll, secretary of the Cleveland Association of Credit Men, as the third member of the board of arbitration which will pass on the proposed power contract between the Cleveland Railway and the Cleveland Electric Illuminating Company. Engineer Joseph Alexander represents the company and Attorney T. L. Sidlo the city.

Franchise Goes Begging.—The city fathers of Henderson, Ky., some time ago drew up a new franchise ordinance which they proposed the Henderson Traction Company should purchase, to take the place of the one that expired on Oct. 22. The franchise was duly advertised for sale without evoking a single response and on the day the old franchise expired the City Council, concluding that no bids would be made, approved a suggestion that cars be permitted to continue running without the franchise. A meeting of the Council has been called to consider the situation.

Franchise Terms of Suburban Line Modified.—As the result of an agreement between the City Council of Seattle, Wash., and the Seattle & Rainier Valley Railway whereby the company is to be relieved of some of its franchise obligations, the company will begin work at once on the construction of its line on Dearborn Street, also an extension of its lines on Genessee Street. By the proposed agreement the company will expend approximately $100,000 in extensions and betterments, and will reduce running time between Seattle and Renton ten minutes. The Council has also agreed to allow the company to operate one-man cars on the Genessee Street extension.

City Replies in Tacoma Case.—City Attorney Harmon of Tacoma, Wash., has filed with the State Public Service Commission at Olympia a reply for the city of Tacoma to the complaint of the Tacoma Railway & Power Company, asking that certain franchise provisions be abrogated because the company was not making a reasonable rate of interest on its investment. The reply by Mr. Harmon was submitted to the city attorneys of Seattle, Spokane, Everett and Bellingham. Attorney Harmon raised the question of the jurisdiction of the Public Service Commission in the matter of abrogating franchise agreements. No date has been set for arguments before the commission.

Status of Norfolk Franchise Matter.—The new Council in Norfolk, Va., which went in on Sept. 1 appointed a committee to handle the matter of a new franchise for the Virginia Railway & Power Company. On Nov. 1 the Council met as a committee of the whole and after considering the proposed franchises for about two hours and voting on various amendments, finally referred it back to the committee and passed a resolution instructing the committee to ascertain the cost of securing an expert to draw new franchises. The cheaper gas committee is preparing data to present to the State Corporation Commission. No date has been set for the hearing.

Toledo Conference to Continue on Nov. 13.—At the conclusion of a conference on Nov. 2, the Street Railway Commission of Toledo, Ohio, adjourned until Nov. 13. A plan of establishing separate routes for the interurban lines and providing better service for their cars in and out of the city was discussed. The feasibility of paying dividends monthly was also before the commission and by some this was considered a good plan, as it would keep the people in closer touch with the proposed new community company. E. P. Usher, president of the Central Labor Union and a member of the Railway Commission, has assured that organization that copies of the franchise will be submitted to civic and labor bodies before it is finally adopted.

Montgomery Light & Water Power Company Wins Suit.—The United States Supreme Court has just denied the application on behalf of Montgomery Light & Traction Company for a writ of certiorari to review the affirmance by the United States Circuit Court of Appeals of the judgment theretofore awarded to the Montgomery Light & Water Power Company in the action instituted by it in the United States District Court to compel the traction company to take and pay for current for the operation of its street railway system from it pursuant to its contract. The contention of the traction company of non-performance on the part of the Water Power Company of said contract justifying a refusal on its part to take current was disposed of by the lower courts adversely to the traction company. The decision of the United States Supreme Court makes the judgment final.

East Cleveland Interests Considered.—In an interview on Nov. 2 between a committee of citizens of East Cleveland and officials of the Cleveland (Ohio) Railway as to the bearing of the proposed annexation of the suburb to the city would have on the street railway situation, John J. Stanley, president of the company, said he would hold the new territory on an equal basis with any other part of the city so far as the franchise and development are concerned. Mr. Stanley said that East Cleveland territory needed extensions and perhaps a crosstown line, but that the company had been unable to make improvements there because of failure to agree on terms of franchise renewal on Hayden and Euclid Avenues. He expressed the belief that the City Council would take a favorable stand on the matter, if the suburb was annexed. Fielder Sanders, street railway commissioner, said that, if the suburb was annexed, the street railway matter would then be under the control of the City Council. On the differences that have existed between the suburb and the company, Council would naturally take a viewpoint favoring its own citizens and in the interest of the people of Cleveland.

PROGRAMS OF ASSOCIATION MEETINGS

Central Electric Traffic Association

The Central Electric Traffic Association will meet in Indianapolis, Ind., on Nov. 13-16, inclusive.

Central Electric Railway Accountant's Association

The Central Electric Railway Accountants' Association will meet in Cincinnati, Ohio, on Friday and Saturday, Dec. 8 and 9.

Illinois Electric Railways Association

The meeting of the Illinois Electric Railways Association, scheduled for Nov. 17, has been postponed until Nov. 28 at the La Salle Hotel, Chicago.

Pennsylvania Street Railway Association

The winter meeting of the Pennsylvania Street Railway Association will be held at the Hotel Adelphia, Philadelphia, Pa., on Tuesday and Wednesday, Dec. 12 and 13.

Central Electric Railway Association

The next meeting of the Central Electric Railway Association will be held at the Secor Hotel, Toledo, Ohio, on Thursday and Friday, Nov. 23 and 24. The executive committee will meet on Wednesday evening, Nov. 22, at the same place.

Safety First Federation of America

The second annual convention of the Safety First Federation of America will be held in Baltimore, Md., Dec. 7, 8 and 9, upon invitation of the Safety First Society of Baltimore. Darwin P. Kingsley, New York, president of the federation, will preside at the sessions. The tentative program includes various subjects pertaining to public safety, such as uniformity in street traffic regulation, the railroad trespass question, fire prevention, health and sanitation, etc., and provides ample opportunity for the discussion of the papers.

Welfare and Efficiency Conference

At the fourth annual welfare and efficiency conference to be held at the Capitol, Harrisburg, Pa., under the direction of the State Department of Labor and Industry, on Nov. 21, 22 and 23, problems relating to the operation of steam and electric railways will be discussed. Governor Martin G. Brumbaugh will deliver the address of welcome. On the afternoon of Nov. 22 William D. B. Ainey, chairman of the Pennsylvania Public Service Commission, will preside. Samuel B. Hare, claim agent of the Altoona & Logan Valley Electric Railway, Altoona, Pa., will discuss "The Accident Problem of the Electric Railways." P. J. McGrath, financial secretary-treasurer of Division No. 85 of the Amalgamated Association of Street & Electric Railway Employees, Pittsburgh, Pa., will discuss the same problem. Similar questions relating to the steam railroads will be discussed the same afternoon.

Financial and Corporate

ANNUAL REPORT

Fonda, Johnstown & Gloversville Railroad

The income statement of the Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y., for the fiscal years ended June 30, 1915 and 1916, follows:

	1916		1915	
	Amount	Per Cent	Amount	Per Cent
Railway operating revenues:				
Freight revenue	$276,788	29.01	$239,574	27.39
Passenger revenue, steam division	51,039	5.35	54,137	6.19
Passenger revenue, electric division	586,208	61.44	536,479	61.33
Mail revenue	3,105	0.33	3,109	0.36
Express revenue	16,759	1.76	14,148	1.62
All other revenues from transportation	5,511	0.58	5,463	0.62
Revenue from other railway operations	14,599	1.53	21,847	2.49
Total operating revenues	$954,011	100.00	$874,761	100.00
Railway operating expenses:				
Maintenance of way and structures	$90,750	9.51	$75,149	8.59
Maintenance of equipment	57,399	6.02	52,553	6.01
Traffic expenses	8,667	0.91	8,155	0.93
Power	37,665	3.95	46,577	5.32
Transportation expenses	233,060	24.43	220,645	25.23
General expenses	65,561	6.87	64,154	7.33
Total operating expenses	$493,103	51.69	$467,236	53.41
Net revenue from railway operations	$460,907	48.31	$407,525	46.59
Railway tax accruals	44,608	4.68	39,500	4.52
Railway operating income	$416,299	43.63	$368,025	42.07
Miscellaneous operations (Sacandaga, N. Y., summer resort)—deficit	2,958	0.31	6,017	0.69
Operating income	$413,341	43.32	$362,008	41,38
Non-operating income	30,559	3.20	31,804	3.64
Gross income	$443,900	46.52	$393,812	45.02
Deductions from gross income	390,037	40.88	380,549	43.50
Net income	$53,863	5.64	$13,263	1.52

The general resumption in business in the cities and towns served by the company was not substantially reflected in its earnings until Dec. 1. During the year an increase in gross of $79,250, or about 9 per cent, was shown. The freight revenues were the largest in the history of the company, showing an increase over last year of $37,213, or 15.5 per cent. Of this $7,838 represented the increase in coal traffic and $29,375 in merchandise freight.

The increase in passenger revenues (electric) amounted to $49,728, or 9.2 per cent, that division carrying 6,586,931 passengers, which figure has never been exceeded except slightly in 1914. During the last seven months of the year more passengers were carried than during the same months of any previous year, which in view of the large number of automobiles in use was most satisfactory. The passenger revenues (steam) decreased $3,097, or 5.7 per cent, due principally to weather conditions and poor excursion business to Sacandaga during July and August of last year. Ticket sales to other points on the steam division showed an increase for the year.

The total operating expenditures of $493,103 showed an increase of $25,867, or 5.5 per cent, over the previous year. Removal of snow and ice cost $14,443, an increase of $9,022, which with amortization of various accounts, depreciation reserves and retirement of equipment exceeded such charges during the previous year by $24,657 and were higher than any preceding year. The company's operating pay roll, included in the above figures, amounted to $357,802, or about 38 per cent of gross revenue—an increase of $34,718, due to higher wages in all departments.

Taxes and income deductions increased, and, while the deficit from miscellaneous operations was smaller, non-operating income fell off. The higher net from railway operations was sufficient to meet these items and still leave an increase in net income from $13,263 in 1915 to $53,863 in 1916. After the payment of preferred dividends of $30,000, there was left a profit and loss balance of $23,863 for 1916, as compared to a deficit of $16,737 in 1915.

"Road and Equipment" account was charged during the year with amounts aggregating $50,615. Of this $29,472 was for paving in Amsterdam, Gloversville and Johnstown, and $10,897 was for five passenger coaches for the steam division. No securities have been issued and sold since 1911, and all additions to property since then, amounting to $256,576, which amount is subject to capitalization, have been financed through the use of surplus earnings and temporary loans.

This company operates 40.75 miles of steam road and 83.97 miles of electric road, a total of 124.72 miles. The following table shows the separate electric and steam revenues and expenses for the last fiscal year, with the increases or decreases as compared with the preceding year:

	Electric		Steam	
	1916	Change	1916	Change
Revenue from transportation	$591,731	+$49,951	$347,680	+$36,545
Revenue from other railway operations	9,928	—8,689	4,670	+1,440
Total electric operating revenues	$601,660	+$41,262	$352,351	+$37,986
Way and structures	$65,682	+$15,372	$25,067	+$228
Equipment	35,972	+4,221	21,426	+623
Traffic	2,794	—368	5,872	+880
Power	37,665	—8,912	....	....
Conducting transportation	142,650	+8,184	90,410	+4,231
General and miscellaneous	50,184	+2,167	15,376	—760
Total operating expenses	$334,949	+$20,665	$158,153	+$5,202
Net revenues	$266,710	+$20,597	$194,197	+$32,784
Operating ratio (per cent)	55.67	—0.41	44.89	—3.76

Dick, Kerr & Company, Ltd.

Considerably improved results are reported by Dick, Kerr & Company, Ltd., the electrical engineers and contractors of London, England, for the last financial year to June 30, 1916, the gross profits having increased from £46,900 to £71,400, and the net profits, after the payment of debenture charges, from £36,300 to £60,900. A sum of £25,000 was again transferred to a reserve against contingencies and 6 per cent was distributed on the ordinary shares, on which no return had been made since 1910-11, when a dividend of 5 per cent was forthcoming. Finally £20,400 was carried forward, or £2,000 more than the amount brought forward from last year.

The directors feel that, though it is difficult to foresee the position of the business in the future, they are warranted by the last year's results in paying the proposed dividend on the ordinary shares. During the last year, in addition to extensions of contracts for the supply of war material, which have kept the works fully occupied, the construction, equipment and management of one of the new national factories was intrusted to the company by the government. During the year the company also acquired control of Willans & Robinson, and the directors anticipate that the acquisition will be of considerable value in the future expansion of business. It is noteworthy that the last year's profits were arrived at after setting aside an undisclosed amount for special taxation.

Boston & Worcester Street Railway

Notwithstanding adverse weather conditions during almost the entire fiscal year, the gross passenger revenue of the Boston & Worcester Street Railway, Boston, Mass., showed some increase for the year ended June 30, 1916. Freight revenue increased 47.6 per cent, and the total increase of revenue from transportation amounted to $60,242, or 8.3 per cent. Expenses of operation, however, materially increased, largely because of the advance in wages. Increased prices of material, supplies and fuel and a substantial increase of snow and ice and electrical equipment expense also added to the total expenses. The income from operation, however, showed a slight increase for the last fiscal year, and 3¾ per cent was paid in dividends on the common stock as compared to 2¾ per cent the preceding year. Surplus for the year, therefore, amounted to $42,205 as compared to $58,126 in 1915.

To give the detailed earning figures for the last two years, it may be said that the total revenue for the year ended June 30, 1916, amounted to $801,253 as compared to $738,796 for the preceding year. Expenses of operation compared as follows: Transportation, 1916, $273,492; 1915, $228,846; maintenance, 1916, $133,349; 1915, $120,425; general expenses, 1916, $81,491; 1915, $81,854; total expenses, 1916, $488,333; 1915, $431,126. The operating income for the two years, therefore, amounted to $312,920 in 1916 and $307,670 in 1915. Deductions showed a slight increase from $170,024 in 1915 to $170,945 in 1916 on account of higher taxes, and the surplus for the year totaled $141,974 in 1916 and $137,645 in 1915. During the year the company operated 2,250,762 car-miles and 154,376 car-hours. The dividends on the preferred shares of the Boston & Worcester Electric Companies, the controlling company, was increased from an amount of $2 to $2.50 per share for the fiscal year.

APPLICATION FOR RECEIVERS FOR THE SEATTLE & RAINIER VALLEY RAILWAY

Counsel States Litigation Is Without Merit or Substantial Foundation

An application for the appointment of a receiver for the Seattle & Rainier Valley Railway, Seattle, Wash., formerly the Seattle, Renton & Southern Railway, has been made to Federal Judge E. E. Cushman by creditors and former stockholders. Judge Cushman has fixed Nov. 16 as the date when the application would be heard on its merits. The plaintiffs are J. W. Wall, who has a judgment against the railway on account of personal injuries; G. A. C. Rochester, administrator of the estate of W. C. Bell, deceased, who also obtained a judgment for personal injuries, and W. F. Bickell, a stockholder of the old company. The application was precipitated by the proposed franchise changes which have been agreed upon by the City Council and the railway. The complainants allege that the bonds of the old company were used by the bondholders, who purchased the company at public auction in May, to pay for the company's assets contrary to law, and that the bonds issued by the newly organized company are void on the ground that they were discounted in violation of the state constitution. It is also asserted that the value of the property is not equal to the securities that have been issued against the company.

The company was reorganized recently and its name changed, after having been operated by receivers since 1912. The property of the company was sold on May 12 and on June 9 the bondholders took over the road, which was bid in by John C. Higgins of Higgins & Hughes, counsel for Augustus S. Peabody, trustee for bondholders, and Peabody, Houghteling & Company, Chicago. In July M. E. Sampsell, Chicago, was elected president of the new company, and Walter Brown was appointed local manager.

The present suit marks another chapter in the litigation which has beset the road since it was organized in 1890 as the Rainier Avenue Electric Railway. In 1894 it passed into the hands of receivers for the first time. Following a sale by the sheriff in 1895, the company, under the name of the Seattle-Renton Railway, was sold to Frank H. Osgood for $90,000. In 1903 the road was transferred to the Seattle, Renton & Southern Railway, the majority of whose stock was obtained in 1906 by William R. Crawford. Following the failure to pay bond and note interest in 1912 the road went into a receivers' hands again, where it remained until sold, in May, 1916.

John C. Higgins, of Higgins & Hughes, has made the following statement concerning the purpose and general merit of the recent development in the case:

"These papers have just been served upon us. We have examined them and think the litigation is without any merit or substantial foundation. It is simply designed to prevent or to embarrass the proposed settlement with the city, under which we are about to proceed with an extension of the railway and the improvement of the service."

Brandon (Manitoba) Municipal Railway.—The earnings from operation of the Brandon Municipal Railway for the year ended June 30, 1916, amounted to $29,258 as compared to $35,969 in the previous year. The operating expenses, however, showed a slight increase from $28,394 in 1915 to $28,660 in 1916, so that the gross income for the year decreased from $7,574 in 1915 to only $598 in 1916. The deductions from income, amounting to $32,552, showed a slight increase, the relative proportion of $20,100 for interest on funded debt, $5,968 for sinking-fund charges and $6,484 for depreciation being about the same as in 1915. The result of operation for 1916 was a net loss of $31,954 as compared to a loss of $24,339 in 1915. The increased net loss for the last fiscal year was due to the closing of the street railway system for ten weeks during the excessively heavy snowfalls of last winter. Not only was the revenue nil during this period, but the City Council decided that the motormen, conductors and carhouse employees should receive employment for the whole of the time the system was closed. The fare passengers carried during the last year totaled 627,739 as compared to 782,011 in 1915.

Bristol & Plainville Tramway, Bristol, Conn.—The stockholders of the Bristol & Plainville Tramway have authorized an increase in the outstanding capital stock of the company from $562,500 to $618,800, and will have the right to subscribe for the new stock at par on or before Nov. 21, on the basis of one share for every ten shares now held.

Boston & Maine Railroad, Boston, Mass.—The annual report of the Boston & Maine Railroad for the year ended June 30, 1916, covers the operations of the two owned electric railway branches, the Portsmouth (N. H.) Electric Railway and the Concord & Manchester, (N. H.) Electric Branch, and the one leased line, the Conway (Mass.) Electric Street Railway. The combined operating revenues of these first two lines for the last fiscal year were $250,358, a decrease of $530 from the returns of the preceding year. The total operating expenses decreased $26,912 to an amount of $158,663, so that the net revenue at $91,695 showed an increase of $26,382. The number of passengers carried increased from 4,916,019 to 4,931,397, while the number of car-miles run decreased from 1,090,202 to 1,068,142. The operating revenue of the Conway Electric Street Railway decreased from $11,107 in 1915 to $10,774 in 1916, but the operating expenses decreased to a greater extent, from $16,006 to $11,176, so that the operating deficit of $4,899 in 1915 was reduced to a deficit of $402 in the last fiscal year. After taxes and interest accrued, the deficit balance for the last year was $7,466 as compared to $11,946 in the preceding year.

Northern Ohio Traction & Light Company, Akron, Ohio.—Hodenpyl, Hardy & Company, New York, N. Y., and E. W. Clark & Company, Philadelphia, Pa., purchasers of the controlling interest in the Northern Ohio Traction & Light Company, during the week ended Nov. 4 placed funds with the Citizens' Savings & Trust Company, Cleveland, for the payment of the purchase price of the stock deposited. A payment of $3 a share had been made a month previously, and the payment on Nov. 4 was to have been $47 a share. The remainder, $50 a share, was to have been paid in one year from that time, but the purchasers decided to clear up the entire transaction at once.

Quebec Railway, Light & Power Company, Ltd., Quebec, Canada.—The gross earnings from operation of the Quebec Railway, Light & Power Company, Ltd., for the year ended June 30, 1916, amounted to $1,731,732 as compared to $1,548,096 in the preceding year, an increase of $183,636 or 11.8 per cent. After adding miscellaneous income of $236,868, the total revenue from all sources for the last year amounted to $1,968,601, an increase of $184,527. The operating expenses rose from $924,817 in 1915 to $1,029,751 in 1916, an increase of $104,934 or 11.3 per cent. The fixed charges and taxes of all kinds amounted to $723,447, leaving a net surplus of $215,403. This, added to the previous surplus, made a total surplus of $562,902 at the end of the year. During the year there was expended on maintenance account the sum of $220,602. The Quebec Railway, Light & Power Company operates 36 miles of line in Quebec and vicinity, including a 9-mile steam and electric road from Quebec to Tourmente. It also does a general lighting and power business.

Syracuse & South Bay Electric Railroad, Syracuse, N. Y.—The Syracuse & South Bay Electric Railroad and the Syracuse, Watertown & St. Lawrence River Railroad were sold under foreclosure on Nov. 1 to the reorganization committee representing the bondholders, for $201,000 and $35,000 respectively. The properties will be reorganized in accordance with the modified plan of reorganization reviewed in the Electric Railway Journal for Aug. 19, page 333.

DIVIDENDS DECLARED

Boston (Mass.) Elevated Railway, quarterly, 1½ per cent.

Pacific Gas & Electric Company, San Francisco, Cal., quarterly, 1½ per cent, original preferred; quarterly, 1½ per cent, first preferred.

Tampa (Fla.) Electric Company, quarterly, 2½ per cent.

Washington-Virginia Railway, Washington, D. C., 2½ per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

BERKSHIRE STREET RAILWAY, PITTSFIELD, MASS.

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Sept., '16	$90,489	*$72,639	$17,850	$27,700	†‡$9,652
1 " " '15	88,743	*62,455	26,288	16,908	‡9,559
3 " " '16	289,085	*223,941	65,144	83,231	†‡17,538
3 " " '15	271,606	*191,754	79,852	50,894	‡29,398

CLEVELAND, PAINESVILLE & EASTERN RAILROAD, WILLOUGHBY, OHIO

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Sept., '16	$43,680	*$25,183	$18,497	$11,455	$7,042
1 " " '15	40,981	*20,616	20,365	10,973	9,392
9 " " '16	351,576	*196,825	154,751	102,553	52,198
9 " " '15	322,121	*176,403	145,718	98,759	46,959

CONNECTICUT COMPANY, NEW HAVEN, CONN.

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Sept., '16	$847,871	*$619,080	$228,791	$97,959	‡$181,761
1 " " '15	754,081	*518,518	235,563	98,014	‡161,289
3 " " '16	2,690,807	*1,896,378	794,434	295,228	‡596,689
3 " " '15	2,356,784	*1,500,086	856,698	294,424	‡631,820

NASHVILLE RAILWAY & LIGHT COMPANY, NASHVILLE, TENN.

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Sept., '16	$206,901	*$127,708	$79,193	$41,887	$37,306
1 " " '15	184,243	*114,182	70,061	43,526	26,535
12 " " '16	2,339,406	*1,436,945	902,461	512,046	390,415
12 " " '15	2,137,834	*1,286,864	850,970	496,497	354,473

NEW YORK & STAMFORD RAILWAY, PORT CHESTER, N. Y.

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Sept., '16	$31,411	*$22,855	$8,556	$7,987	‡$626
1 " " '15	37,310	*26,015	11,295	8,000	‡3,364
3 " " '16	117,156	*81,596	35,560	23,961	‡11,763
3 " " '15	133,351	*86,752	46,599	24,000	‡22,808

NEW YORK, WESTCHESTER & BOSTON RAILWAY, NEW YORK, N. Y.

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Sept., '16	$50,689	*$45,996	$4,693	§$5,816	†‡$321
1 " " '15	41,652	*40,840	812	§6,354	†‡3,828
3 " " '16	146,761	*135,574	11,187	§19,851	†‡5,696
3 " " '15	124,885	*125,456	†569	§20,542	†‡15,541

NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Sept., '16	$446,666	$286,763	$159,902	$44,759	$115,143
1 " " '15	340,917	212,823	128,094	53,081	75,013
11 " " '16	3,780,743	2,298,334	1,482,409	447,760	1,034,649
11 " " '15	2,829,360	1,748,733	1,080,627	466,669	613,958

PORTLAND RAILWAY LIGHT & POWER COMPANY, PORTLAND, ORE.

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Sept., '16	$453,731	*$244,193	$209,538	$178,811	$30,727
1 " " '15	454,856	*258,679	196,177	184,165	12,012
12 " " '16	5,422,757	*3,052,791	2,369,966	2,179,732	190,234
12 " " '15	5,639,948	*3,081,249	2,558,699	2,210,355	348,344

REPUBLIC RAILWAY & LIGHT COMPANY, YOUNGSTOWN, OHIO

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Sept., '16	$334,443	*$183,689	$150,754	$72,351	$78,641
1 " " '15	266,302	*153,933	112,369	56,845	55,636
9 " " '16	2,930,648	*1,707,140	1,223,508	628,182	599,809
9 " " '15	2,234,921	*1,372,515	862,406	503,691	359,899

RHODE ISLAND COMPANY, PROVIDENCE, R. I.

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Sept., '16	$515,829	*$363,735	$152,085	$120,714	‡$33,072
1 " " '15	474,919	*352,574	122,345	120,821	‡3,082
3 " " '16	1,672,570	*1,104,535	568,035	362,118	‡210,739
3 " " '15	1,458,559	*1,021,732	436,827	361,389	‡79,683

WESTCHESTER STREET RAILROAD, WHITE PLAINS, N. Y.

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Sept., '16	$18,372	*$19,805	†$1,433	$1,865	†‡$3,269
1 " " '15	23,397	*21,172	2,225	1,598	‡656
3 " " '16	62,574	*64,077	†1,503	5,543	†‡6,964
3 " " '15	74,131	*66,072	8,059	4,786	‡3,364

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*Includes taxes. †Deficit. ‡Includes non-operating income. §Excludes interest on bonds, charged income and paid by New York, New Haven & Hartford Railroad under guarantee, also interest on notes held by the New York, New Haven & Hartford Railroad, not credited to the income of that company.

Traffic and Transportation

SIX-CENT FARE AUTHORIZED

Following Massachusetts Commission, New Hampshire Body Approves Fare Increase for Massachusetts Northeastern—Zones Made Uniform

The New Hampshire Public Service Commission, on Oct. 31, authorized the establishment of a 6-cent fare unit on the Massachusetts Northeastern Street Railway, Haverhill, Mass. An abstract of the decision of the Massachusetts Public Service Commission authorizing the 6-cent fare unit on this system within its jurisdiction was printed in the Electric Railway Journal of Oct. 28, page 951. Hearings were held in Boston jointly with the Massachusetts commission in 1915, a further hearing being held in New Hampshire early this year.

The company operates 45.87 miles of single track in New Hampshire and 82.44 miles in Massachusetts. It does not give service in any city or large town in New Hampshire, its entrance into Nashua being over the tracks of the Nashua Street Railway. The company heretofore charged 5 cents in each zone, and sold school-children's and workingmen's tickets on certain lines at reduced rates. The new tariff filed by it raises the general rate to 6 cents and proportionately increases the charge for the special tickets. As far as the rates are interstate, the Interstate Commerce Commission allowed the new tariff to take effect without question. The Massachusetts commission, after extended investigation, approved the tariff in the main, except as to certain zones radiating from the center of the cities of Lawrence and Haverhill. Lastly, the New Hampshire commission has found the new tariff reasonable in all respects. It went into effect on Nov. 1, the date to which it was suspended.

Like the Massachusetts body, the New Hampshire commission finds that the control over security issues and the scaling down of the issues of constituent companies upon consolidation, taken together with the very moderate capitalization per mile of road as compared with other like properties, preclude any charge of over-capitalization. The increase of rates cannot be said to represent an attempt to earn a return on watered securities. For the purposes of this case, in view of the financial history of the road, without attempting a valuation in detail of the property, its outstanding capitalization is taken as a moderate measure of fair value.

None of the constituent companies in New Hampshire has ever paid any dividends, and the Massachusetts Northeastern Street Railway, since consolidation, has paid one dividend of 3 per cent on the preferred stock, and none on the common. The fiscal year 1916 was the best in the company's history. In that year, after paying operating expenses and fixed charges, the net income remaining was $39,213—a sum insufficient for the payment of dividends on the preferred stock. This net income, the commission finds, was obtained only at the expense of an utterly inadequate reserve for depreciation. The road and equipment are in excellent condition of maintenance, the service generally satisfactory, and the management clearly and admittedly efficient. It is obvious, the finding states, that the failure of the company to earn a fair return can be attributed only to inadequacy of rates. The company is unquestionably entitled to such an increase within reasonable limits, as will, if possible, produce such a return.

The income requirements of the company, and the extent to which they will probably be met by the increase in rates, were fully discussed by the Massachusetts commission, and are not reviewed *in extenso* by the New Hampshire body. The latter board finds that if the raise in rate resulted in no decrease in traffic the revenue of the company would still be insufficient, after meeting operating expenses and fixed charges, to provide for depreciation and for the gradual payment of the floating debt, and to give even the minimum dividend of 6 per cent upon the common stock. It is obvious that the company has a legal right to make the proposed increase, unless the rates contemplated are in themselves unreasonable, as being more than the service is worth. Yet for the reasons stated in the Manchester & Nashua, and Manchester & Derry cases, recently decided, it cannot be held that a 6-cent fare for zones of normal length on an interurban road in New Hampshire is unreasonable, when it does not produce more than a fair return.

The new tariff involves one readjustment of fare zones in New Hampshire. Hitherto the line from Hudson Center to Pelham Center has constituted a single zone, 6.22 miles in length. It is proposed to divide this into two zones, from Hudson Center to the Hudson-Pelham town line, 3.1 miles, and from the town line to Pelham Center, 3.12 miles. There is no other zone on the system equal in length to the zone as heretofore established, the average zone being about 3 miles in length. The statutory prohibition against discrimination would seem to be clearly violated by the establishment in one particular locality of a fare zone twice as long as zones generally on the same system in other localities of like character, when there are no considerations of competition, density of traffic or cost of service to justify the discrimination. No such conditions exist in this particular case, and there is no apparent justification for giving to this locality an obviously "undue or unreasonable preference or advantage." In the absence of special circumstances justifying a deviation from uniformity, it is said, the zones should be of as nearly equal length as the topography of the line will permit.

BUFFALO FARE PROCEEDING FINALLY AUTHORIZED

City Council After a Dozen Votes Decides in Favor of Rate Investigation

The City Council of Buffalo, N. Y., on Nov. 1, approved the application of Corporation Counsel William S. Rann for permission to apply to the Public Service Commission for an investigation into the rates of fare charged by the International Railway over its Buffalo city lines. Thomas Penney, vice-president and general counsel of the company, opposed the application and branded the threatened action of the City Council as a mere reprisal against the railway because of its action against the city for a review of its special franchise assessment, claimed to be unjust and exorbitant.

Favorable action by the City Council came as a surprise in view of the fact that the application of the corporation counsel was made almost two months ago, and after a series of hearings and conferences there appeared to be little inclination to favor the recommendation. Almost a dozen votes were taken and each time the application was defeated by a vote of four to one, but after a mass of evidence had been introduced before the Council by the city law department the application was approved.

The International Railway charges a straight 5-cent fare during all hours of the day with universal transfers for which no charge is made. Transfers are issued so as to allow passengers to reach any point in the city by the most direct route. A single 5-cent fare is also charged to Kenmore, a residential suburb north of the city line.

Following the approval of the application for a rate investigation, Mayor Louis P. Fuhrmann issued this statement to the ELECTRIC RAILWAY JOURNAL correspondent:

"I am opposed to using a rate proceeding simply as a big stick to prevent a corporation from exercising its legal rights. The corporation counsel assures us that he proposed this investigation in good faith and intends to put it through to a decision and with that assurance I am content.

"The prosecution of a rate proceeding involves the city in considerable expense, and if we can judge the length of time by other rate proceedings, this one, it is safe to say, will extend over a year or two. The corporation counsel seems to be strongly of the opinion that lower fares will result. While I am not personally so sanguine of the results as he is, I feel that he is better qualified to forecast the result. Lower carfares will result in a large saving to our citizens, and if this can be brought about it should be done.

"Many years ago the street railways then operating in the city, now consolidated into the International Railway, entered into a contract with the city, known as the Milburn agreement, whereby the charge for a transfer from one line to another was abolished and universal free transfers were granted and a rate of fare of 5 cents was fixed. If the institution of this rate proceeding is to abolish free transfer privileges then it is a serious matter. I am advised by the corporation counsel that the prosecution of a rate investigation can in no wise prejudice our right to free transfers.

"I feel, therefore, that the rate proceeding should be instituted and prosecuted to a speedy decision, and I trust that the result of it will be lower carfares for our people."

TWO-CAR FREIGHT SERVICE APPROVED IN BOSTON

The Public Service Commission of Massachusetts has issued a comprehensive finding approving the general principles of two-car electric railway freight service, based upon petitions of the Boston Elevated Railway and the Bay State Street Railway. Supervision of such service by the commission is declared essential to its proper limitation with respect to passenger traffic, but the board holds that a large and at present unutilized opportunity for broader development exists in eastern Massachusetts. In the opinion of the commission, the companies have as much right to operate freight trailer cars as they have to operate passenger trailers. The board enunciates the advantages to the public and to the companies of electric freight service in hours when the passenger traffic is at a minimum or below the mid-day and peak volume, and believes that the development of electric railway freight and express service should be encouraged, so long as such service is not permitted to encroach upon passenger traffic. The finding points out that the streets are not adapted to any large-scale development of electric railway freight service, and cannot, with propriety, be converted into freight yards. At the present time, in the judgment of the commission, such danger is remote.

The year ended June 30, 1916, was a banner year for electric railway freight and express business in Massachusetts, yet the Bay State company received from this source only $426,996 out of a total operating revenue of $9,770,609, while the Boston Elevated Railway received only $82,835 out of a total of $18,686,972. Traffic of a materially greater volume can be handled, in the commission's opinion, without public detriment under the regulation of local authorities and of the board. The commission is of the opinion that properly constructed and operated trailer cars can handle an equal volume of traffic with less public inconvenience and discomfort in two-car trains than in single cars.

FIRST PASSENGER TRAIN FROM NORTH SHORE THROUGH CHICAGO LOOP

The Chicago, North Shore & Milwaukee Railroad ran its first passenger train over the elevated system in Chicago on Nov. 6, to bring a party of 100 women from the North Shore town of Glencoe through Chicago to the Union Stock Yards on the South Side, where they visited the Armour Company's plant. The party was carried on a two-car steel train which had been equipped with third-rail shoes in order to operate on the elevated system, and the trip was made in one hour and twelve minutes. On the train a colored maid was provided to take care of the wraps, and each lady was presented with a corsage bouquet by the railway and a box of chocolate creams by Marshall Field & Company. At the stock yards the Armour Company served luncheon to them and one of their special lecturers took the party through the plant. While this is the first passenger train to make the trip over the city elevated lines, the company is carrying from two to ten tons of papers to the North Shore towns as far as Waukegan each morning on a train leaving the Fifth Avenue Terminal at 5.30 o'clock.

DETROIT REROUTING PLAN UP TO COUNCIL

On Oct. 31 the Common Council of Detroit, Mich., received the joint report of the committees on public utilities and on traffic and police regulations in favor of granting the Detroit United Railway permission to put in curves and other track work necessary to permit of the rerouting of cars to relieve the present frightful congestion in the heart of the city. In its report the committee said:

"Your committees believe the plan should be given a fair trial. Your committees, however, feel that the power to fix the routes should be reserved to the Common Council and the accompanying resolutions so provide."

The provision on this point in the resolution states:

"It is further resolved that the Common Council reserves the right to continue the routes as now established or to make such changes in the routing of said cars as in its judgment may be necessary."

The committee's report was debated for and against for a considerable period. Alderman Littlefield led the opposition and moved that the report be referred back, stating he wanted it to die there, but on motion of Alderman Ellis it was laid on the table for a week in order that the members of the Council might familiarize themselves with the matter.

NEW ALBANY FARE TARIFF

The change in rates on the Albany-Troy line of the United Traction Company, Albany, N. Y., noted in the ELECTRIC RAILWAY JOURNAL for Nov. 4, page 996, related to a new tariff filed by the company with the Public Service Commission and not to authorization by the commission of the increase mentioned. The case of the company before the commission in which it sought permission to increase the fare between Albany and Troy from 10 cents to 15 cents was disposed of some time ago by the commission refusing to grant the increase. The new tariff which the company has issued is designed to become effective on Nov. 25. It seeks the elimination of transfers on the Albany-Troy interurban line. This matter has not yet come before the commission for a hearing.

San Francisco and United Railroads in Transfer Agreement.—An agreement recently made between the Municipal Railway, San Francisco, Cal., and the United Railroads provides for an exchange of transfers on a basis of equality between the two lines at Fillmore and Union Streets, where the two systems intersect.

Service Stars for Washington Employees.—The Washington Railway & Electric Company, Washington, D. C., has introduced merit and service badges in the form of five-pointed gold stars to be worn by uniformed employees on the left sleeve, each star indicating five years of continuous service of the employee wearing the insignia.

Heating Order in St. Louis.—An order has been issued to the United Railways, St. Louis, Mo., by the State Public Service Commission, regulating the heating and ventilating of the cars this winter. The new rule requires the ventilators and fresh-air inlets to be kept open at all times except when the temperature outside falls below 10 deg. Fahr.

Petition Presented for Permission to Abandon Service.—The Sandpoint & Interurban Railway, Sandpoint, Idaho, has applied to the Public Utilities Commission of Idaho to be allowed to discontinue the operation of its service between the city and the Great Northern Railway station, and between the city and Ponderay and Kootenai. The company says that the lines are unprofitable.

Park Traffic Stimulated.—Gen. John B. Castleman, president of the Board of Park Commissioners of Louisville, Ky., has stimulated travel on several street railway lines by giving an interview to the newspapers dwelling on the beauties of the autumn coloring in the city's parks. The general mentioned two of the parks particularly, both reached by lines of the Louisville Railway.

Near-Side Stops in Houston.—The near-side stop rule has been put into effect on the street railway lines of the Houston (Tex.) Electric Company. The rule is strictly enforced on all paved streets, but motormen are required to use their judgment at unpaved crossings as to the best side of the street for taking on or unloading passengers. This rule was put into effect on recommendation of the city public service department.

Committee Appointed to Consider Changes in Traffic Ordinance.—A safety-zone committee will be appointed by the commissioner of public works of Buffalo, N. Y., to consider proposed amendments to traffic ordinances so as to create safety zones in the business section. The committee will consist of a representative of the International Railway, the Automobile Club, the Team Owners' Association, the Auto Truck Owners' Association, the Auto Truck Manufacturers' Association, a taxicab company and four other citizens. It is said that one-way traffic in certain congested streets will be advocated.

Jitney and Railway Traffic Compared. — According to checks completed by A. L. Valentine, superintendent of public utilities of Seattle, street railway traffic over the Latona Bridge made a large gain, as compared with jitneys in the last year. Comparing one day last October with one day of October of this year, from 6 a. m. until midnight, the check shows that 449 street cars, carrying 10,766 passengers, were operated this year, and 426 cars, carrying 8353 passengers, a year ago. In one day during October this year 568 jitneys, carrying 2411 passengers, were operated across the bridge, as compared with 1038 jitneys carrying 4613 a year ago

Record Fair Traffic in Dallas.—Approximately 1,500,000 people were carried by the street cars of Dallas, Tex., during the sixteen days of the Texas State Fair, from Oct. 14 to Oct. 29, according to a check of conductors' receipts made in the office of Richard Meriwether, general superintendent of the Dallas Consolidated Electric Street Railway. It is estimated that more than 1,000,000 of these people rode to and from Fair Park. Not a single accident was reported during this time. A regular schedule of one car every forty-five seconds was maintained to Fair Park and during home-going hours five cars were loaded each minute in front of Fair Park gates.

See Mary Pickford Via Sedalia Cars.—To promote street car riding during the dull evenings, the City Light & Traction Company, Sedalia, Mo., has devised a novel scheme. The Sedalia company has made arrangements with the Luna Moving Picture House to honor transfers at its box office for 5 cents in payment of a 10-cent admission to the picture show. This conversion privilege is carried out the first part of each week from 6 p. m. to 11 p. m. The moving picture house charges but a small per cent of the original 5 cents and carries most of the loss. According to S. B. Ireland, general manager, the plan has been in effect a week, and in that time an increase in traffic has been noticed.

United Railroads to Post Accident Records.—A record of the accidents on the lines of the United Railroads, San Francisco, Cal., shows that during July the number of car-miles per accident was 3,955 and the number of passengers carried per accident was 32,546. In August and September the number of accidents was greater, a comparison of September with July showing a decrease of 995 car-miles per accident and 5,987 passengers per accident. Hereafter, according to an announcement in the *United Railroads Magazine* by William Von Phul, vice-president and general manager of the company, a statement of all accidents will be posted monthly in each division, classified as to their character.

Front End Fare Collector in Vancouver.—Aiming at speedier service, the British Columbia Electric Railway, Vancouver, B. C., has placed an extra fare collector at the point where outgoing cars stop on Hastings Street at its intersection with Main during the rush hours, so that passengers on paying a fare to him may enter the car by the front end as well as by the rear. The extra collector will be on duty between 4.30 and 6.30 o'clock on weekday afternoons and between 12.30 and 1.30 o'clock on Saturday afternoons. This is an experiment and the company has publicly expressed the hope that its patrons will adapt themselves to the new scheme so that they may benefit by the saving in time.

Toledo Automobilists Scored.—G. O. Smith, safety expert with the Doherty Operating Company, spent some time in Toledo, Ohio, recently in connection with the safety campaign of the Toledo Railways & Light Company. One of his chief criticisms related to the manner in which automobiles are driven. He said that in the business district the city furnished good semaphores and the police officials seemed to be alert, but in the residence districts, automobile drivers apparently paid no attention to the principles of safety. As long as drivers did not realize the responsibility that rested upon them, or were unwilling to assume at least a portion of that resonsibility, accidents were sure to occur, no matter how careful the motormen were.

Personal Mention

E. C. Thomas, general agent of the passenger department of the Pacific Electric Railway, Los Angeles, Cal., has been assigned to special duties.

F. E. Billhardt has been appointed traveling passenger agent of the Pacific Electric Railway, Los Angeles, Cal., with headquarters at Los Angeles.

H. O. Marler, traveling passenger agent of the Pacific Electric Railway, Los Angeles, Cal., will have supervision of the work formerly handled by E. C. Thomas.

R. E. Kelly, formerly traveling passenger and freight agent of the Pacific Electric Railway, Los Angeles, Cal., for the Eastern district, with headquarters at San Bernardino, has been appointed general agent for same territory.

John G. Williams, formerly statistician and accountant of the Public Utilities Commission of the District of Columbia, has resigned to become a member of the valuation staff of the Interstate Commerce Commission. His successor is James H. Botz.

L. O. Gordon, manager of the Valparaiso (Ind.) Lighting Company, has been appointed manager of the Jackson Light & Traction Company, Jackson, Miss., to succeed Raymond H. Smith, whose appointment as manager of the Sheboygan Railway & Electric Company, Sheboygan, Wis., is announced elsewhere in this column.

John M. Atkinson having resigned from the office of chairman of the Public Service Commission of Missouri will engage in the general practice of law in St. Louis, Mo. Mr. Atkinson will specialize in rate, valuation and reorganization cases and all other matters affecting public utilities, before state public service commissions and the Interstate Commerce Commission, and all classes of antitrust suits in State and Federal courts. He was formerly assistant attorney general of Missouri, is the author of the public service commission law of Missouri, and was speaker of the House of Representatives of Missouri.

L. H. Palmer, who was appointed acting general manager of the Eastern Pennsylvania Railways, Pottsville, Pa., on May 8, was appointed general manager of the company on Nov. 1. Mr. Palmer became connected with the Eastern Pennsylvania Railways in April, 1916, as general superintendent. He was appointed acting general manager following the death of W. B. Rockwell. Mr. Palmer was a member of the class of 1902 at Williams College. For five years he was employed in the operating department of the Central Railroad of New Jersey at Jersey City. He entered the service of the Metropolitan Street Railway, New York, N. Y., now the New York Railways, in the fall of 1906 as a clerk in the office of Oren Root, vice-president and general manager. In April, 1908, he was appointed assistant to the general manager for the receivers of that company, and in April, 1909, was made superintendent of transportation. He resigned from the Metropolitan Street Railway in November, 1912, to join the organization of Harrison Williams. In June, 1915, Mr. Palmer went to Baltimore, Md., to do some special work for the president of the United Railways & Electric Company. He resigned from that company to go to Pottsville. Mr. Palmer has been very active in the work of the American Electric Railway Transportation & Traffic Association.

Raymond H. Smith, general manager of the Jackson Light & Traction Company, Jackson, Miss., has been appointed general manager of the Sheboygan Railway & Electric Company, Sheboygan, Wis. The property at Sheboygan was recently acquired by the American Public Utilities Company, which also owns the property of the Jackson Light & Traction Company. Mr. Smith has been connected with the railway and light property at Jackson since November, 1912. He entered the employ of the Waterbury (Conn.) Traction Company in 1897 and occupied various positions until 1900, at which time he was transferred from the transportation department of the company to the headquarters of the Connecticut Railway & Lighting Company, Bridgeport, Conn., which absorbed the Connecticut Traction Company and several other properties in Connecticut. At Bridgeport Mr. Smith was made purchasing agent and secretary to J. E. Sewell, general manager. In 1903 he was made superintendent of transportation in Bridgeport and shortly after was appointed superintendent with jurisdiction extended to the repair shops and power plants. In August, 1907, Mr. Smith was appointed general manager of the Albany & Hudson Railroad, which operates a high-speed third-rail system from Albany to Hudson, the local service in the latter place, the gas plants in Rensselaer and Hudson and furnishes electricity for lighting and power. In July, 1909, he was appointed receiver of the Albany & Hudson Railroad and a few months later was made general manager of the Albany Southern Railroad, the successor to the Albany & Hudson Railroad. He continued with the Albany Southern Railroad until he was appointed to the position at Jackson. In Jackson Mr. Smith quickly identified himself with the business and social interests. He was the first president of the Jackson Rotary Club. Subsequently he was made a member of the Board of Trade of Jackson and last year was vice-president of that organization. He was one of the organizers of the Country Club and is vice-president of the club. When the Associated Charities of Jackson was organized, Mr. Smith was placed on the board of directors and received public recognition in the Jackson *Daily News* for his work in the interest of that body. In commenting editorially on Mr. Smith's resignation from the Jackson Light & Traction Company, the *Daily News* said in part: "Raymond Smith is the sort of a man that Jackson simply can't afford to lose. His fairness, his courtesy, his sense of justice, his willingness to put a shoulder to the wheel in behalf of any worthy cause, have not only served to popularize the public service corporation under his control, but have made the man an asset of tangible value to the entire community. The local lighting and street railway plant did not hold a high place in public favor when Mr. Smith came to Jackson. To bring about a complete change in public attitude, and at the same time put the property on a paying basis, was no small task, yet it was accomplished, and by a complete stranger who quickly won his way into the hearts of our people. It is not strange, therefore, that our citizens feel like assembling in mass meeting and putting forth an earnest protest over Mr. Smith's transfer to a new field of labor. Our people feel that he belongs here, and that they ought to have a prior claim to his services, notwithstanding that he has received a substantial promotion in recognition of his splendid work for the company."

OBITUARY

C. F. Emery, a pioneer in street railway work and for the greater part of his life associated with the Cleveland (Ohio) Railway, died at his home in East Cleveland on Nov. 1. Mr. Emery was born in New Hampshire and began work in that State in a chair factory. He went West and entered the same business. He promoted a race track on Miles Avenue, Cleveland, and so laid the foundation for his fortune. Some years later he established a transportation line between the old Wedell house, on Superior Avenue, and Woodland Avenue. This proved a success and he became a stockholder in one of the street railways. He served for many years as vice-president of the Cleveland Railway and its predecessors. A widow, three daughters and two sons survive.

Joseph S. Wells, secretary and treasurer of the Utah Light & Traction Company, Salt Lake City, Utah, is dead. Mr. Wells succumbed to pneumonia on Oct. 18 after a very brief illness. He was born on May 25, 1862, and entered business as a clerk. He became associated with the Utah Light & Railway Company in 1889, in which year he was also appointed secretary of the Salt Lake City Railway. In 1891 he became the company's secretary and treasurer, and in 1901 he was chosen as secretary and treasurer of the Consolidated Railway & Power Company. In 1904 he was made vice-president and cashier of the Utah Light & Railway Company and in 1906 general manager, which office he held until the recent transfer of the control from the Harriman estate, since which he had been secretary, treasurer and a director of the company.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Atlanta & Anderson Electric Railway, Atlanta, Ga.—Application for a charter has been made by the Atlanta & Anderson Electric Railway to construct a line from Anderson to Atlanta, via Hartwell, Royston, Commerce, Jefferson, Hoschton, Duluth, Norcross, Doraville, Chamblee, and Decatur, 140 miles. The line will connect at Anderson with the line of the Piedmont & Northern Railway and will join the Decatur line of the Georgia Railway & Electric Company and also the tracks of the Georgia Railroad at DeKalb Avenue, in DeKalb County, and, according to the petition, will use both of these lines into Atlanta. Among the incorporators are J. L. Murphy, Kirkwood, W. H. Wright, L. G. Mann and Paul D. Reid, all of Atlanta. [Sept. 9, '16.]

FRANCHISES

Peoria, Ill.—The Peoria & Chillicothe Electric Railway has accepted the forty-eight year franchise granted by the Council of Peoria to operate cars over the tracks of the Peoria Railway along Adams Street. [Nov. 4, '16.]

Scranton, Pa.—The Scranton & Binghamton Railway has received a franchise from the Council of Scranton to construct an extension into the center of the town.

Nashville, Tenn.—The Nashville Railway & Light Company has received an extension of its franchise from the City Council of Nashville. It is planned to extend Deaderick Street from Fifth Avenue to the Capitol Boulevard and double-track Deaderick Street. The double tracks will also be laid through the Capitol Boulevard to Church Street, forming a loop which will give an all-car service in the business section of the city. An arcade is to be placed from Deaderick Street to the transfer station. Under the ordinance introduced, the entire expense of making the changes is to be borne by the Nashville Railway & Light Company. Other improvements scheduled in the ordinance are to lay an additional track on Fourth Avenue, south, from Broadway to the Sparkman bridge, a double track across the bridge to First Street and from there a single track, with necessary switches, on Shelby Avenue to Eleventh Street. The ordinance also calls for laying a track on Fifth Avenue, south, from Broadway to Mulberry Street, through private property to Second Avenue, and thence to Lafayette Street and the corporate limits. It will require laying a double track on Fifth Avenue, north, from Deaderick Street to Johnston Avenue. Extension of the West End street car system is proposed by laying a necessary track to operate a line on Compton Road from West End Avenue to Blakemore Avenue.

Huntington, W. Va.—The Ohio Valley Electric Railway Company has received an extension of its franchise from the city of Huntington to run to 1955. In return the company has agreed to make three extensions to its lines within five years, making a total of about 3 miles of new track and involving an expenditure of $100,000. After being in operation ten years it will pay an excise tax of 1 per cent on the gross revenue from two of the extensions.

TRACK AND ROADWAY

Montecito Railroad, Los Angeles, Cal.—This company reports that it will construct a 1-mile extension during the coming year.

San Francisco-Oakland Terminal Railways, Oakland, Cal.—The Railroad Commission of California has issued an order authorizing the San Francisco-Oakland Terminal Railways to abandon for five years the operation of street cars on San Pablo Avenue, from the southerly boundary line of Richmond to Potrero Avenue.

Connecticut Company, New Haven, Conn.—The Public Utilities Commission of Connecticut has granted the Connecticut Company permission to relocate and straighten its tracks to conform to the widening of Congress Street from Housatonic Avenue to Main Street, Bridgeport.

Chicago (Ill.) Surface Lines.—A permit has been received by the Chicago Surface Lines from the superintendent of streets to construct extensions on Ewing Avenue from 108th Street to 118th Street, on 118th Street from Ewing Avenue to Brandon Avenue and on Brandon Avenue from 118th Street to 136th Street.

Woodstock & Sycamore Traction Company, Genoa, Ill.—A report from the Woodstock & Sycamore Traction Company states that it contemplates electrifying its road. The company operates a line between Sycamore, Genoa and Marengo, 26 miles, gasoline cars being used.

Murphysboro Electric Railway, Light, Heat & Power Company, Murphysboro, Ill.—A contract has been awarded by the Murphysboro Company to the Heman Construction Company, St. Louis, Mo., for the construction of an extension to Carbondale. Work will be begun at once and will be completed within six months. The cost of the proposed extension will be about $2000,000.

Union Traction Company of Indiana, Anderson, Ind.—Work has been begun by this company double-tracking 1 mile of track on its Indianapolis-Anderson division leading into Indianapolis. The cost is approximately $40,000.

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind.—This company has begun raising its tracks 6 in. through Wayne County, Ind.

***Fort Madison, Iowa.**—It is reported that plans are being considered for the construction of an electric railway from Fort Madison to Keokuk, via Nauvoo, and probably to Quincy, Ill. J. M. Fisher, H. S. Payne and J. M. Smith, all of Nauvoo, are interested.

Morristown & Erie Railroad, Morristown, N. J.—The Morristown & Erie Railroad will electrify its line extending from Morristown to Essex Falls, 11 miles. The company has leased for six months an Edison electric storage battery car for a tryout under all weather conditions. If it is successful the company will purchase two cars and operate the road on a largely increased schedule.

Salem & Pennsgrove Traction Company, Salem, N. J.—Plans have been revised for the rebuilding of two spans of the Penns Neck bridge to permit the Salem & Pennsgrove Traction Company to operate its cars over the structure. The revision of plans was made necessary because some of the bids for the work ran as high as $72,000.

Buffalo & Depew Railway, Buffalo, N. Y.—This company reports that during the spring of 1917 it will construct its proposed extensions from Depew to Bowmansville, 2 miles, and from Depew to the New York Central Railroad Station at Lancaster, ½ mile.

Interborough Rapid Transit Company, New York, N. Y.—Operation was begun by the Interborough Rapid Transit Company on the Ely Avenue extension of the Queensboro Subway from Hunter's Point Avenue station in Queens north to the new Queensboro Bridge Plaza station on Nov. 5. The extension will ultimately continue west from Park Avenue to Times Square. At the Bridge Plaza station in Queens it connects with the Astoria and Corona elevated extensions which are being pushed to completion and which should be in operation within the next few months. The Public Service Commission for the First District has approved two agreements providing for the completion of the connection between the West Farms branch of the First Subway and the Jerome Avenue extension of the Lexington Avenue subway at 149th Street and Mott Avenue, and for the lengthening of the platforms of the Mott Avenue station of the First Subway about 280 ft. to the east. The two agreements have been submitted to the Board of Estimate for approval and for the appropriation of the necessary funds. The work of completing the physical connection between the First Subway and the Jerome Avenue line will be done by the Interborough Rapid Transit Company and paid for at an estimated cost of about $110,000. The station platform lengthening will be paid for by the city at an estimated cost of about $350,000.

Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio.—This company will lay 100-lb. rails from the Toledo & Ohio Central Railroad track to the eastern corporation line of Bucyrus next spring. The foundation will be of cement and the rails will be laid on steel ties.

Toledo Railways & Light Company, Toledo, Ohio.—A resolution was adopted by the City Council of Toledo on Nov. 6, requesting the Toledo Railways & Light Company to extend the Cherry Street line to the city limits in West Toledo. Another resolution asks for a Y-switch on Detroit Avenue at the terminal of the South Avenue line. A third asks for the removal of the tracks from the east to the west side of Miami Street for some distance and that a loop be built at the end of the line, so that single-ended cars may be used.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.—Work which was begun about a year ago has practically been completed by the Mahoning & Shenango Railway & Light Company on the reconstruction of its tracks from Wilson Avenue, East Youngstown, to Spring Common on West Federal Street. The improvement involved an outlay of more than $250,000.

Sand Springs Railway, Tulsa, Okla.—This company reports that it is double-tracking its line.

Brantford & Hamilton Electric Railway, Brantford, Ontario.—The Board of Railway Commissioners has authorized the Brantford & Hamilton Electric Railway to reconstruct its bridge across the Toronto, Hamilton & Buffalo Railway at Cainsville.

London, Ontario.—The townships of South Dorchester, Westminster and Dereham will submit a bylaw to ratepayers in January to provide $1,000,000 for a new hydroelectric railway.

London (Ont.) Street Railway.—It is reported that this company is completing the construction of a second track on a 2000-ft. section of Dundas Street, west of the fair grounds. The company plans to extend the Hamilton Road line from the present terminus at Egerton Street to West Street, 2200 ft.

Porcupine-Rand Belt Electric Railway, Porcupine, Ont.—Plans are now being revived by the Porcupine-Rand Belt Electric Railway for the construction of its proposed line. The company was incorporated in 1912, to construct an interurban railway from a point near the eastern boundary of the Province of Ontario in McGarry to Larder City, McVittie, Hearst, Gauthier, McElroy, Lebel, Boston, Dane, Otto, Teck, Grenfell, Eby, Burt, Holmes, Alma, Baden, Robertson, McNeil, Argyl, Hincks, Cleaver, Geikie, Bartlett, Musgrove and Doyle and surveys were said to have been completed for some of the lines. A special general meeting of shareholders was called to be held in Toronto recently to elect directors, to close a contract with the Porcupine Construction Company, to build two branch lines from Boston Creek to Swastika and from the Temiskaming & Northern Ontario Railway via Larder Lake, and for other purposes. W. J. James, Allandale, Ontario, secretary-treasurer. [Feb. 23, '13.]

Montreal (Que.) Tramways.—This company plans to construct at an early date an overhead bridge on Fortification Lane, Montreal.

Dallas, Tex.—Mark Lowd, chief engineer for the Stone & Webster interests in Texas, announces that a double track steel bridge will be constructed over the Trinity River and across the bottoms and will carry the interurban tracks and the tracks of the Oak Cliff street-car lines. This double track steel bridge will form a part of the steel and concrete viaduct that will span the Trinity River and bottom lands from the tracks of the steam railroads entering the new Union Passenger Terminal to First Street in Oak Cliff. The interurban lines recently completed a portion of this viaduct, constituting the eastern approach and that portion which spans the tracks of the railways, at a cost of $110,000. The street-car lines and all interurbans entering Dallas from the west and south now use this overhead crossing. Mr. Lowd announced that work on the extension of this viaduct will begin soon after the Dallas franchise traction problems are settled and will be pushed to completion. It is estimated that the work will cost something more than $300,000.

San Antonio, Gonzales & Houston Interurban Railway, Houston, Tex.—This company proposes to erect the following bridges in connection with its proposed line from Houston to San Antonio: Across Brazos River at Richmond; Colorado River at Garwood; Lavaca River; Guadalupe River at Gonzales; iron span with trestle approaches. Steeve Holmes, Leesville, president. [Oct. 28, '16.]

Marlin-Temple Interurban Company, Marlin, Tex. — William Ginnuth announces that the right-of-way for the Marlin-Temple Interurban Company has been secured through Bell County. Construction work is now under way on the bridge that is to span the Colorado River between Temple and Marlin. [Sept. 16, '16.]

Charleston (W. Va.) Interurban Railroad.—This company reports that it expects to construct an extension from Cabin Creek Junction to Montgomery, 10½ miles, in 1917.

Wisconsin Interurban System, Madison, Wis.—It is reported that work on this company's proposed line from Madison to Portage, Prairie du Sac and Janesville will be begun in the spring of 1917. J. E. Jones, Madison, president. [Sept. 2, '16.]

SHOPS AND BUILDINGS

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind.—This company is considering the erection of a new depot at its Washington Street terminal in Paris.

Reading Transit & Light Company, Reading, Pa.—This company plans to erect two passenger shelters for people awaiting street cars in the middle of Penn Square at Fifth Street, providing public sentiment is not against the improvements and the City Council grants the necessary permission. The shelters would be lighted and heated and provided with seats, with an announcer to call out the arrival of cars. The cost would be about $5,000.

Wisconsin Interurban System, Madison, Wis.—It is reported that this company, which proposes to construct a line from Madison to Portage, Prairie du Sac, and Janesville will construct some small passenger stations in the spring of 1917. J. E. Jones, Madison, president.

POWER HOUSES AND SUBSTATIONS

Aurora, Plainfield & Joliet Railway, Joliet, Ill.—This company reports that it is moving its substation from Joliet to Plainfield.

Albia Light & Railway Company, Albia, Iowa.—A report from the Albia Light & Railway Company states that it might rebuild its power house within the next three months. The company has purchased three 250-hp. Murray water tube boilers and expects to purchase one 400-kva. generator, one 100-kva. generator and one 300-kw. railway machine.

Kentucky Traction & Terminal Company, Lexington, Ky.—Announcement has been made by Kentucky Traction & Terminal Company that arrangements have been made for the installation of a 4000-kw. turbine generator in the local powerhouse. This will supplement the two 2500-kw. turbines installed some months ago.

Vicksburg Light & Traction Company, Vicksburg, Miss.—This company plans to install a 15,000-kw. turbo-generator and auxiliary equipment.

St. Johns (N. B.) Street Railway.—This company is building a brick and concrete pumping station at St. Johns.

Toledo Railways & Light Company, Toledo, Ohio.—A new 20,000-kw. turbine has been purchased by the Toledo Railways & Light Company for its Water Street power house. The installation of this unit will bring the capacity of the station up to 85,000 kw.

Quebec Railway, Light & Power Company, Quebec, Que.—This company has ordered a 2000-hp. motor generator from the Canadian Westinghouse Company.

Galveston (Tex.) Electric Company.—This company announces it will install a 300-kw. motor generator in its plant at Galveston.

Ashland Light, Power & Street Railway, Ashland, Wis.—This company will increase the capacity of its power house at Ashland from 3000 to 10,000 hp. An addition will be made to the boiler room and four 600-hp. boilers will be installed. A new concrete stack will also be built.

INDUSTRIAL NEWS

Review of Trade and Market Conditions

Rolling Stock Purchases **Business Changes** **Trade Literature**

EXTREME CONDITIONS CONFRONT THE MANUFACTURER

Shortage of Materials and Labor—Criticisms from Purchasers on Account of Slow Deliveries—Patience the Keynote

Never before have manufacturers in the electric railway industry been confronted with problems so serious as those now being faced. The chief trouble in their production departments has been shortage of raw materials and skilled labor. A secondary situation, developed in the sales department, is that of strained relations with customers due to slow deliveries. This latter situation should not have been as general as it now is had more patience been exercised by both buyer and seller and had the actual manufacturing conditions been set before the buyers in a more convincing way.

It is now, and for some time it has been, practically impossible for manufacturers to get deliveries of raw materials with any degree of certainty. High premiums have helped but little, and conditions seem to be growing worse rather than better. Some of the prominent manufacturers in the electric railway industry deeply resent being criticised for not having done the impossible. The manufacturers as a class feel that they have been doing heroic work in order to meet the requirements of their customers, yet it is stated that occasionally the railway purchasing agent seems to overlook or disregard the existing market conditions and unduly charges the manufacturer for delay in shipments, when it has been absolutely impossible to fulfill contracts made in normal times.

EXPRESSING RAW MATERIALS

Manufacturers have put enormous pressure on the producers of raw materials and have gone to the extra expense of having their raw materials expressed into their factories in order to accelerate delivery. In fact, it has not been uncommon for deliveries of very heavy materials to be shipped by express in order to save a few days' time for the benefit of the railway company. Raw materials must be paid for now at top-notch prices, and, as freight service is unusually slow, there are daily illustrations of express shipments between raw material producers and manufacturers paid for by the manufacturers which in ordinary times would be regarded as an economic waste. For example, the transportation by express of a carload of special steel from central New York to a factory in Illinois in order to save a comparatively small time on the delivery of the finished product illustrates but one of the extremes to which the manufacturers have gone in their endeavors to make more prompt deliveries.

When a manufacturer goes to such expense it should be quite evident to the purchaser that everything has been done to accelerate delivery which could reasonably be expected under existing conditions. It has been pointed out, however, that sometimes purchasing agents consider these heroic efforts on the part of the manufacturer as a part of his obligation to the purchaser, and therefore the manufacturer gets little credit for his extra effort. In fact, if the deliveries are greatly delayed the manufacturer, it is said, may consider himself lucky if he retains the good-will of such customers.

STEEL AND COPPER DELIVERIES UNRELIABLE

The manufacturer's real problem right now is with the producers of his raw material. As pointed out recently in the *Iron Age*, "Never have producers of iron and steel had so many delicate questions to settle as to what is right in allotting deliveries to their customers. In ordinary affairs the distinction between what is right and what is wrong is supposed to be quite clearly defined, but when mills are behind in deliveries there is simply a choice of evils. The ambition of the average steel maker is to allot the delivery so that all customers will be equally served, that such inconvenience as must be suffered shall be equally distributed."

The iron and steel industry is becoming seriously embarrassed by a shortage of coke and coal, due to the shortage of labor and of cars. The pig-iron situation is becoming strained, and with an increasing consumption it looks as though the furnaces might not be able to take care of the demand. Stocks have become low and prices are stronger, with some talk that there may be a scarcity of ore another season.

Of any one raw material, however, the most difficult for the electric railway manufacturer to obtain at the present time is copper. The shortage of copper for delivery before July, 1917, has caused some of the large sellers to announce that they will be out of the market for the first quarter. One authority estimated that there was only 5 per cent, or approximately 50,000.000 lb., of 1917 copper remaining unsold for delivery before July. These figures are said to be based on a refining capacity next year of 2,000,000 long tons.

Malleable-iron parts are almost impossible to obtain in some sections of the country, and in all sections the price per pound for a given pattern has advanced 200 or 300 per cent. Every conceivable means has been taken to accelerate and stabilize malleable deliveries. One manufacturer has made duplicate patterns and places his malleable-iron orders with more than ten different foundries. Thus, if one foundry has a strike or is so overcrowded that it cannot possibly approach delivery promises the order can be quickly shifted to any one or more of the others on a reliable working basis, and the earlier established relations prevent a waste of time in preliminary negotiations.

The foregoing shows the conditions with regard to some of the raw materials. There are so many others upon which the manufacturers of electric railway equipment depend that it would be out of the question to review them at this time. However, it is safe to say that, so far as raw materials are concerned, the manufacturers have never before been called upon to expend so much money and effort in order to get their supplies. Most electric railway material manufacturers have greatly added to their production departments, and many have gone so far as to withdraw men from their sales organizations and send them out at a considerable expense to locate and to get deliveries of raw materials.

SALES MANAGER SPEAKS FOR MANUFACTURERS

To quote one sales manager: "It is not uncommon in these times for people who furnish raw materials to tell the manufacturer that 'No definite promise of shipment can be made.' If the manufacturer were to make a similar statement to his railway customer the chances are the relation between the two would become strained, to say the least; yet the average railway customer in placing an order with the manufacturer insists upon having a certain definite promise of shipment, which is frequently extremely difficult for the manufacturer to meet with certainty. The reasons for this, of course, are the conditions of the raw materials market and existing labor questions.

"The reputable manufacturer, of course, bases his promises with the railway company upon shipping promises which he has received from the people who supply him with raw materials, and he does his utmost to secure promises of shipment upon which he can rely. The raw material man does not sacrifice profit to keep delivery promises, as does the average manufacturer when dealing with railway companies. In short, the point to be emphasized is that the manufacturing companies are working under the most trying conditions in industrial history; and railway buyers should hesitate to condemn them for delays in shipment, particularly where there is evidence to the effect that the manufacturer has done his utmost to make good."

In the larger plants production has been such a task that it has been physically impossible to fulfill orders in a routine way. Therefore it has been necessary frequently to deliver to one customer part of the material manufactured in advance for another customer. In this way the emergencies of the various customers have been met as best could be done.

Future Conditions Doubtful

The conditions in the manufacturing field to-day warrant much thinking and the exercise of much patience on the part of both buyer and seller before either is condemned by the other for failure to fulfill promises made but a short time ago. The situation changes very rapidly. No one can tell what new condition will confront the manufacturing industry a month or even a week hence, and things in industrial circles are moving so fast that any noticeable change in the raw material situation one week seems to affect the dependent industries almost immediately.

A spirit of mutual helpfulness has always been prevalent in the electric railway industry. The manufacturers serving that industry are credited by the railways with having done their full share toward the development of improved mechanical and engineering equipment. And it is fair to presume that in the trying times of the last few months promises have been made for deliveries of material that strictly could not be fulfilled. Allowances for most of such failures have been made, and it is to be hoped that in the future nothing will happen to mar the fine spirit with which the buyers and sellers have formerly co-operated.

LARGE DEMANDS FOR PORCELAIN INSULATORS CANNOT BE MET

Scarcity of Skilled Labor as Well as of Malleable Fittings —Railway Buying Normal—Higher Prices Probable—Buying Heavy for 1917

Porcelain insulator manufacturers have large orders on hand and are experiencing difficulty in getting sufficient men and material to keep production in pace with orders. The material shortage is not one of clay, but of the metal fittings for suspension insulators. The insulator manufacturers are also embarrassed by a shortage of skilled labor in the potteries. Buyers are actively seeking increased quantities of insulators, but owing to the difficulties mentioned some manufacturers are not soliciting orders for the suspension insulators as actively as for those of the pin type.

Inquiries are coming from all sections of the country except the South and the Pacific Coast states; from these sections some manufacturers report good business, while others report it only fair. In the mining field the demand is 50 per cent greater than that of last year. In fact, insulator purchases in all divisions of the electrical industry except railways are far above normal. In the electric railway business inquiries for insulators are said to be about normal.

While the prospects for orders are excellent, conditions inside the factory are not all that the manufacturer could desire, as it is difficult to accelerate production. One factory, for example, is stated to be 500,000 suspension-type and 75,000 pin-type insulators behind in its orders, and ninety days is absolutely the best delivery that can be promised. Conditions in other plants are quite similar, and it would not be surprising if deliveries of four months will be quoted in the near future.

Insulator prices have advanced four times during the past year, the total increases being about 30 per cent, and, due to the general increase in the cost of manufacture, even higher prices are anticipated unless there should be some remarkable change in industrial conditions. Labor, more than any other item, is said to be responsible for the increased prices. On account of the location of many insulator factories near munitions plants, it is only with great difficulty that the insulator manufacturers can keep their mechanics from being enticed by extraordinary wage offers into the war material factories. Generally speaking, the insulator manufacturers state that they have plant facilities to operate at about 50 per cent above normal. Not many, however, are running at that rate, because they cannot obtain men to operate the equipment satisfactorily; and the trade does not have a large following of skilled workmen such as is found in most other industries.

Owing to large demands and uncertain manufacturing conditions, salesmen are advising their customers to place orders in advance of present requirements. The prospects are good for heavy buying until at least the middle of 1917, and the problem now is one of manufacturing and making deliveries rather than that of getting orders.

JOHN B. KILBURN ON FOREHANDEDNESS IN BUYING

Manufacturers Have Difficulty in Placing Orders with Steel Mills for Delivery Within Six Months

Among the comments received on the article mentioned above, which appeared in the Electric Railway Journal for Oct. 21, 1916, on page 915, was one from John B. Kilburn, vice-president, Hale & Kilburn Company, Philadelphia, Pa., which is as follows:

"We have noted with interest your articles on the subject of "Forehandedness Desirable in Buying," and believe the comments are very timely. Probably we cannot add much in the way of suggestion to what has already been offered, unless it is to say that in the case of a large number of the materials entering into our manufactures the cost has advanced enormously, and the chief difficulty is in securing material within any reasonable time at any price. In the case of steel, as you are probably aware, the principal mills refuse to accept orders—particularly for sheet metal—for delivery inside of six months, and it has been the custom this fall to take all the orders offered and divide their tonnage proportionately among the customers.

"Another feature is that where it was possible heretofore to place contracts for probable requirements with the provision that regular monthly quotas not used could be canceled, mills now refuse to accept a provision of this kind and require customers to take what they contract for.

"Therefore, manufacturers are more cautious and are unable to provide as fully as heretofore for future requirements, unless by carrying an enormous stock to insure early delivery of their product. All of this, with many similar changes from standard methods of doing business, emphasize the necessity for placing car contracts long in advance of requirements in order to secure reasonable delivery and most favorable prices."

CAR ENAMELS AND VARNISHES

Langdon B. Valentine Comments on the Use of Varnish and Enamel

An article entitled, "Car Painting Materials Are High," which appeared in the Electric Railway Journal of Oct. 14, 1916, page 859, set forth in a brief way a review of the trade conditions in the paint, oil and varnish field, so far as it has to do with the construction and maintenance of electric railway equipment.

The article stated that there was a growing tendency among electric railways to change the outside painting of cars from paint and oil coats with varnishes to enamel.

Langdon B. Valentine, second vice-president, Valentine & Company, New York, N. Y., commenting on the earlier article, said in part:

"You are correct in stating that the prices of raw materials entering into the manufacture of paints and varnishes are now very high. Since your article was written there have been further advances.

"In regard to the use of enamels for finishing the outside of electric railway cars, we believe that this is not the correct method of finishing to insure the most permanent as well as the best looking job. Some roads are using enamels on their old equipment where they do not wish to spend the time and money for a first-class job, as there is no doubt but what there is a saving in first cost by the use of enamels.

"We have made hundreds of experiments testing out the relative durability of enamels and clear finishing varnish over flat color. There is absolutely no doubt but the clear finishing varnish will hold its luster much longer and outwear any enamel."

COPPER AND OTHER METAL PRICES RISING

Copper for December Delivery Is Quoted at 30 Cents and Iron and Steel Gradually Advancing

Again the swing of the pendulum of the metal market is felt and prices are advancing. Early this week electrolytic copper was quoted nominally at 29.5 to 30 cents for immediate delivery with December delivery but 0.25 cent lower. This is an advance of 1 cent per pound during the week, and several very heavy inquiries at these prices have been received. Holders of the red metal, however, are not particularly eager to sell at these quotations, anticipating as they do to dispose of their holdings at much better prices.

Nor is the spot market alone in this condition. Reports from producers indicate as a conservative estimate that 80 per cent of the copper to be produced during the first quarter of 1917 has been sold, while of that to be produced during the first six months of 1917 from 60 to 70 per cent has been contracted for. Under such a strain the market advanced to 28.75 cents for first quarter electrolytic and 27.75 for first half 1917 electrolytic.

According to reports, brass manufacturers have been the biggest buyers of late.

Pig iron and steel prices are steadily advancing. During the first week in November billets advanced by around $5 a ton. Rods, bars and plates were the same, but shapes advanced about 4 per cent. Black sheets advanced slightly and galvanized sheets from $4.75 to $5. Large buying by manufacturers is reported to be the reason for the advancing market.

ROLLING STOCK

New York Municipal Railway Corporation, New York, N. Y., is reported to be asking for bids on 100 subway cars.

South Bethlehem & Saucon Street Railway, South Bethlehem, Pa., has placed an order for one single-truck freight car.

Springfield, Troy & Piqua Railway, Springfield, Ohio, has purchased a new trailer car and one freight car from the Barney & Smith Car Company.

New York Central Railroad, New York, N. Y., is reported to be preparing to order eighteen 70-ft. multiple-unit cars for the Hudson River electric division.

Hammond, Whiting & East Chicago Railway, Chicago, Ill., are in the market for two four-motor, semi-steel, monitor-deck, double-truck, pay-as-you-enter cars.

Morristown & Erie Railroad, Morristown, N. J., has leased from the Railway Storage Battery Company a 50-ft. combination baggage and passenger Edison storage battery car to be used temporarily until new cars can be supplied by this company. The seating capacity of the car is 45.

TRADE NOTES

Perry Ventilator Company, New Bedford, Mass., has received an order to equip with ventilators the fifty cars recently ordered by the Boston Elevated Company from The J. G. Brill Company.

Carbo Company, Chicago, Ill., has moved its office to the factory at Chicago Heights, Ill., which will enable it to keep in close touch with factory operations and to fill orders with greater promptness in the future.

H. H. Lytle has been appointed representative west of the Mississippi River for the National Safety Device & Manufacturing Company, Chicago, Ill., to sell this company's air rectifier, which is designed to prevent frozen air-brake troubles.

The Valentine-Clark Company, Minneapolis, Minn., whose entire plant was reported destroyed by fire, did not suffer as badly as was reported. The company was fortunate in not losing its buildings, tools, and treating plants, nor a substantial part of its stock, and it is now prepared to fill orders for Northern or Western red cedar from its Minnesota transfer yard.

The Johnson Fare Box Company, Chicago, Ill., is placing forty-four equipments of its fare boxes for metal tickets, which is a complete equipment for the system, on the cars of Public Utilities Company at Evansville, Ind.; fifty-four boxes, which is a full equipment for the pre-payment type cars of the Mobile Light & Railroad Company, Mobile, Ala., and thirteen equipments for as many new cars in Wilmington, N. C. Orders have also been received for these boxes for some of the lines of the Holyoke, Mass., and Watertown, N. Y., properties.

ADVERTISING LITERATURE

Detroit Fuse & Manufacturing Company, Detroit, Mich., has issued Bulletin 37-A on its "Square D" steel inclosed switches.

Pyrene Manufacturing Company, New York, N. Y., has issued a pamphlet on metal boxes and vehicle brackets for fire extinguishers.

Safety Car Devices Company, St. Louis, Mo., has issued a sixteen-page bulletin on the safety car brake with safety control features.

Smith-Ward Brake Company, New York, N. Y., has issued an illustrated pamphlet describing a brake-lever strut for use on slack adjusters.

R. D. Nuttall Company, Pittsburgh, Pa., has issued bulletin No. 15 on trolley poles, trolley wheels, harps, sleet cutters and trolley bushings.

Ohio Brass Company, Mansfield, Ohio, agent for Crouse-Hinds headlights, has issued a folder on "Imperial" incandescent headlights for city service.

Wheel Truing Brake Shoe Company, Detroit, Mich., has issued a pamphlet showing sections representing some of the different styles of its grinding shoes.

Collins Metallic Packing Company, Philadelphia, Pa., has issued a pamphlet on wheel flange lubrication showing the use of the Collins wheel flange lubricator.

Chicago Pneumatic Tool Company, Chicago, Ill., has issued bulletin 34-Z describing and illustrating the type N-SS automatic high speed steam driven compressors.

Differential Car Company, New York, N. Y., has issued Bulletin D3 setting forth the advantages of its differential electric dumping car with traversing tilting body.

Ohmer Fare Register Company, Dayton, Ohio, has issued a pamphlet descriptive of its fare box system. The pamphlet bears the title, "A Basis of Better Business."

Cobb Shockless Railroad Crossing Company, Los Angeles, Cal., has issued a report of the operating tests that have been made with this type of railroad crossing. The report covers an installation which was made in 1914 and which is still in operation at the present time.

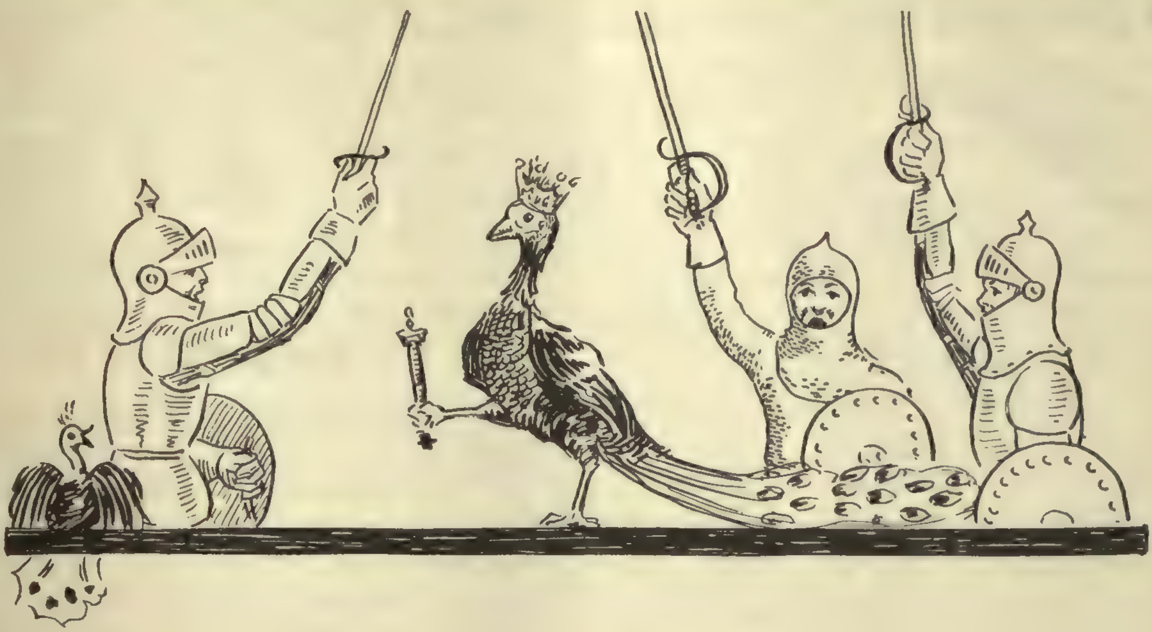
Root Spring Scraper Company, Kalamazoo, Mich., has issued a thirty-two-page pamphlet on the "Passing of the Sweeper." This pamphlet describes and illustrates the scrapers made by this company, which include both hand and air-operated types for double-truck cars.

NEW PUBLICATION

Electrical Railways, by Henry M. Hobart, M.I.C.E., reprinted by the Institution of Civil Engineers, Great George Street, Westminster, S. W., London, England. Eighty-eight pages. Paper.

This is a reprint of the "James Forrest" lecture prepared by Mr. Hobart and delivered for him in his absence by J. A. F. Aspinall at the meeting of the Institution held on Dec. 14, 1915.

In this lecture Mr. Hobart first gave a brief résumé of the subject of power supply for heavy electric railways, illustrating the discussion by reference to the Butte, Anaconda & Pacific Railway electrification. He compared the performance of the steam locomotive with that of the electric locomotive, illustrating his comparison by reference to the Chicago, Milwaukee & St. Paul and the Norfolk & Western electrifications. The experience of the New York Central Railroad was also mentioned. He concluded with a comparison of the d.c. and a.c. systems, his conclusions being summarized thus: "The author is satisfied that the high-pressure direct-current system is so distinctly superior in essential respects as ultimately to insure its general use on main-line railways in preference to the single-phase system or any of its modifications."



Peacock Elected King

The old-time Irish, like their descendants, were a bright lot of birds.

They picked their chiefs and kings on the basis of merit. Thus one chronicler wrote that—

"The candidate must be free from all blemishes or personal deformities likely to impair his efficiency or to lessen the respect of the people for him."

Because the Peacock Brake is free from all blemishes likely to impair its efficiency, it has been elected King of Brakes by the electric railway nobles throughout the land.

The graduated application, the automatic stop, the balanced gear ratio, the quick-winding eccentric, the easy-turning roller bearing are among the royal qualities of King Peacock. They enjoy the deserved respect of all the electric railway community.

The Eccentric Drum

National Brake Co.
Buffalo, N. Y.

Bankers and Engineers

Electric Railway Lighting and Power Company Bonds
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You can secure just the man you desire to strengthen your organization by placing an advertisement in the Searchlight Section of the

ELECTRIC RAILWAY JOURNAL

This paper is read by progressive men, many of whom are ambitious for better positions than they now have. They study our "Positions Vacant" columns each week for opportunities for advancement.

You can get in touch with a number of these competent men and select the one best fitted for your needs, by stating in an advertisement in our Searchlight Section the experience and qualifications you require and telling what you have to offer. The cost will be only 3 cents a word, minimum charge $1.50 an insertion.

We suggest that you use in the advertisement either your own name, that of one of your employees, or a local post office box number or street address, so that the replies (letters and telegrams) will come direct to you. If you prefer to have the replies addressed to a box number in one of our offices, they will be enclosed in new envelopes and remailed to you promptly each day.

Hundreds of prominent employers now use this method of securing the men needed in their organizations. May we not help you also?

Electric Railway Journal
239 West 39th Street
New York City

MASON SAFETY TREADS—prevent slipping and thus obviate damage suits.

KARBOLITH CAR FLOORING—for steel cars is sanitary, fireproof and light in weight.

STANWOOD STEPS—are non-slipping and self-cleaning.

Above products are used on all leading Railroads. For details address

AMERICAN MASON SAFETY TREAD CO.

Main Offices: Lowell, Mass.
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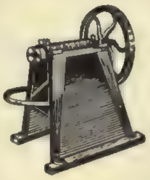

Saved from the Ashes as many tickets are, means nickels lost to you. Avoid the risk.

Patten Ticket Destroyer is used right in the office under the eyes of trustworthy employes.

It mutilates beyond redemption.

Scrap sold will pay for the machines.

Ask us for Circular J.

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RAILWAY UTILITY CO.

Sole Manufacturers

"Honeycomb" and "Round Jet" Ventilators

for Monitor and Arch Roof Cars, and all classes of buildings; also

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ELECTRICAL TESTING LABORATORIES
Electrical, Photometrical and
Mechanical Testing.
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Columbia Trolley Wheels

For Winter Weather

Our splendid foundry facilities enable us to turn out perfect trolley wheels by the thousands at moderate prices.

In addition to our standard solid trolley wheels for general service, we direct your attention to the

Columbia Sleet Cutting Wheel

The ideal trolley wheel for insuring uninterrupted collection of current during the prevalence of hail, sleet, snow or ice. Does its work effectively without the aid of auxiliary sleet-cutting devices. *Beat Winter to it,* by ordering your Columbia sleet wheels now!

Columbia trolley wheels of both types in diameters of 4-in., 5-in. and 6-in. are in stock ready for immediate shipment. You can meet many other of your wants by ordering from this general list of Columbia products.

Here are some Columbia-made specialties conveniently listed:

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- Armature and axle straighteners
- Armature buggies and stands
- Babbitting molds
- Banding and heading machines
- Car replacers
- Coil taping machines for armature leads
- Coil winding machines
- Pinion pullers
- Pit jacks
- Signal or target switches
- Tension stands

CAR EQUIPMENT

- Armature and field coils
- Brush-holders and brush-holder springs
- Brake, door and other handles
- Brake forgings, rigging, etc.
- Car trimmings
- Commutators
- Controller handles
- Forgings of all kinds
- Gear cases (steel or mall. iron)
- Grid resistors
- Third-rail contact shoes and accessories
- Trolley poles (steel) and wheels

Columbia Machine Works & Malleable Iron Co.

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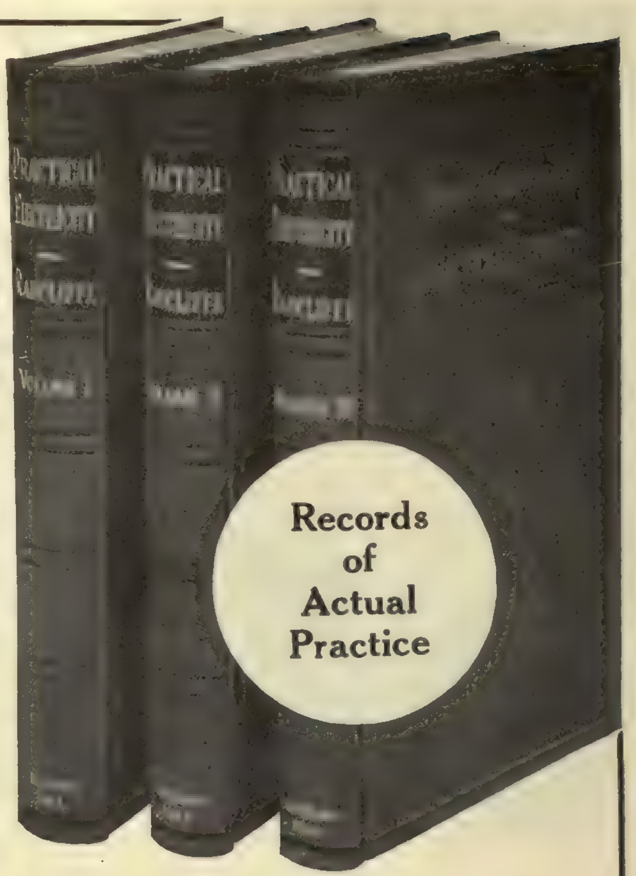
Every Reader of the Electric Railway Journal

who is interested in the practical side of electricity will profit by an examination of the

HOME STUDY COURSE IN PRACTICAL ELECTRICITY

Recently Completed



It is presumed that every one who reads the Electric Railway Journal is in some way interested in the subject of electricity—and it is therefore believed that every reader should examine this innovation in the electrical book world—because the entire text matter is taken from actual electrical work by a practical electrical engineer, and it was written with a view to answering the questions that arise daily in practically every branch of electricity.

The author, with his exceptional knowledge of the practical side of electricity, gained through years of actual experience and technical training, has succeeded in bringing out in question and answer form a remarkable work—remarkable in that the questions contained in the seven hundred pages have actually been asked, and the answers by the author are based on facts borne out by experience.

Being free from theory and complex mathematics, the books are admirably fitted to the needs of the man who wants a quick and correct answer to his numerous electrical problems that are constantly coming up.

We would like to prove, entirely at our expense, that you should possess Radcliffe's work. If you will fill out the attached coupon and return it to us at once we will send the three volumes by parcel post prepaid for you to look over. If they are satisfactory send us $1 per month for six months. If for any reason whatsoever you do not want them we will supply return charges.

These three volumes sent to you free for ten days' examination

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City and State ....

Where employed ....

Occupation .... ERJ 11-11

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Let us help you solve the Clinch Ear Problem

One of the most expensive ideas to follow in line construction or maintenance is "Ears are Ears." Probably on no other single item of line materials are the niceties of design, the importance of careful workmanship, and honest materials so vital—or so easily overlooked.

Busy line superintendents and careful purchasing agents know how much Drew Clinch Ears simplify their work.

Drew Clinch Ears have proved their worth

Wherever costs are figured closely—you'll find Drew Clinch Ears in service. There is a type for every need.

When in the market for any line material, it will pay you to have Drew quotations.

DREW
Electric & Mfg. Co., 1016 E. Michigan, Indianapolis, Ind.

Blot Out the Cause

Rot is one of the mighty forces that is always working to the detriment of the maintenance engineer and the company's earnings. Sometimes it's called corrosion, or electrolysis—but with wood it's plain r-o-t.

Reeves Wood Preserver

Will mitigate the effects of rot in poles, cross-arms, ties, and all kinds of construction timber.

It is applied COLD with a brush (like paint) or by dipping in an open vat. It penetrates like ink into a blotter and checks rot in its incipiency. The least it will do is to double the life of wood. The most it will cost is but a trifle compared to the savings it will effect in purchases of new material and the cost of erection.

No, it will not corrode the hardware, wash or sweat out. You can prove it yourself with our test outfit.

Write for it to-day

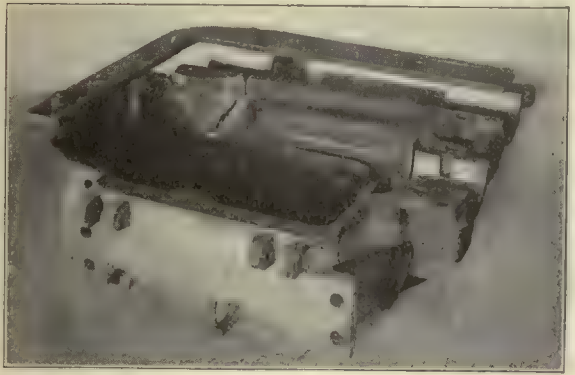
REEVES

The Reeves Co.
New Orleans, La.
THE EASY WAY TO PREVENT DECAY

Oxy-Acetylene Welding and Cutting

Typical Repair Savings Made by Welding

Brass brush holder, worth when new, $4.27. Reclaimed from junk pile by 3½ minutes' welding, at a cost of a few cents.



Damaged steel motor housing made good as new by oxy-acetylene welding. Cost of materials, labor and gas used, $1.25.

By oxy-acetylene welding shop and track repairs are made quickly, efficiently and at least cost.

Take for instance, the typical repairs shown above—only a small part of one day's savings made by a Prest-O-Lite welding outfit in the E. St. Louis and Suburban shops.

Take a look at *your* junk pile and see the possibilities it has for you to make substantial savings with this simple, low-cost welding process.

Prest-O-Lite
PROCESS

Employs both gases (acetylene and oxygen) in portable cylinders. Prest-O-Lite Dissolved Acetylene (ready-made carbide gas) is backed by Prest-O-Lite Service, which provides dry, purified gas, insuring better welds, quicker work, and lower cost, and also avoids the large initial outlay and heavy depreciation incurred in making crude acetylene in a carbide generator.

Necessary equipment is not expensive. We furnish high-grade welding apparatus for $60 (Canada, $75); acetylene service at additional cost. Adaptable for oxy-acetylene cutting by the addition of special cutting blow-pipe. Thorough instructions are furnished free to every user of Prest-O-Lite Dissolved Acetylene—any average workman who understands metals can learn the process quickly and easily.

Send today for illustrated data on the savings made by oxy-acetylene welding for other roads

The Prest-O-Lite Co., Inc.

The World's Largest Makers of Dissolved Acetylene

Main Offices and Factory
805 Speedway, Indianapolis, Ind.

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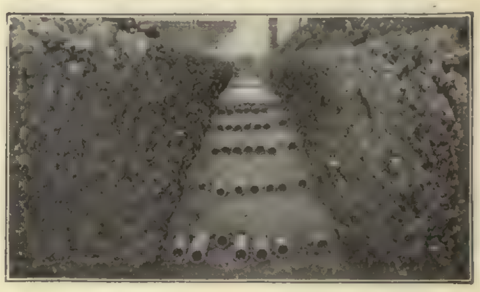
Merritton, Ontario

53 Branches and Charging Plants

6600 Volts Strong—Between Conduit Joint and Lead Sheath

If there is any one place to look for weakness in underground ducts it is at the joints between lengths. It was to prove that J-M Fibre Conduit was the exception to this rule that a breakdown test was recently made.



The joint tested was a standard socket joint between two lengths of Type M Conduit. It took 6600 volts to break through the lead cable sheath.

The high resistance of J-M Fibre Conduit even at the joints speaks loudly for its efficiency in guarding against stray currents and electrolytic action.

There are many other points of superiority established on test that you should know about. Ask the Electrical Dept. in J-M Branch nearest you.

Serves more people in more ways than any other Institution of its kind in the world.

JOHNS-MANVILLE SERVICE
COVERS THE CONTINENT

Branches in all large cities

H. W. JOHNS-MANVILLE CO.
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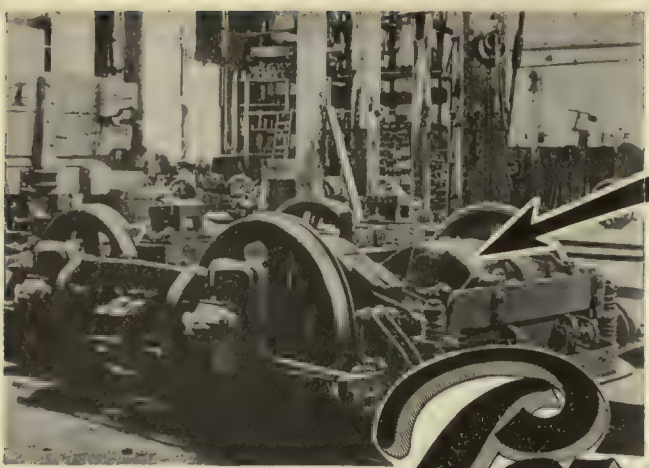


Burn-outs Are Few and Far Between When You Use

Packard

INSULATION

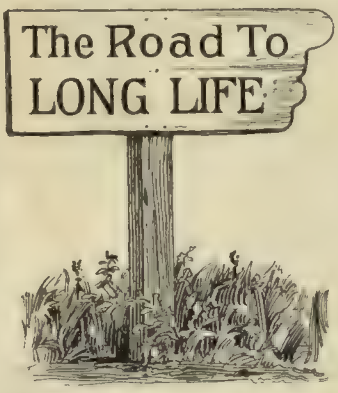
We couldn't buy them good enough for our own purposes so we make them.

INSULATING
VARNISHES, COMPOUNDS, CLOTH, ETC.

We are continually testing them out alongside insulating materials of other makes and have never yet found the equal of Packard.

Write Dept. ERJ for samples and prices

The Packard Electric Company, WARREN, OHIO


The Road To LONG LIFE

"Bayonne" is to Car Roofing What Creosote is to Wood

You know how Creosote will stave off the ravages of the elements and add years of life to wood.

In the same way Bayonne treatment applied to Bayonne close-woven special fabric produces a roofing that gives maximum wear with the minimum maintenance. The impregnation, which is thorough and automatic, is done by us at our plant, and the finished Bayonne Roofing is shipped ready to be attached to the roofs of your cars. Only one color coat is necessary after installation.

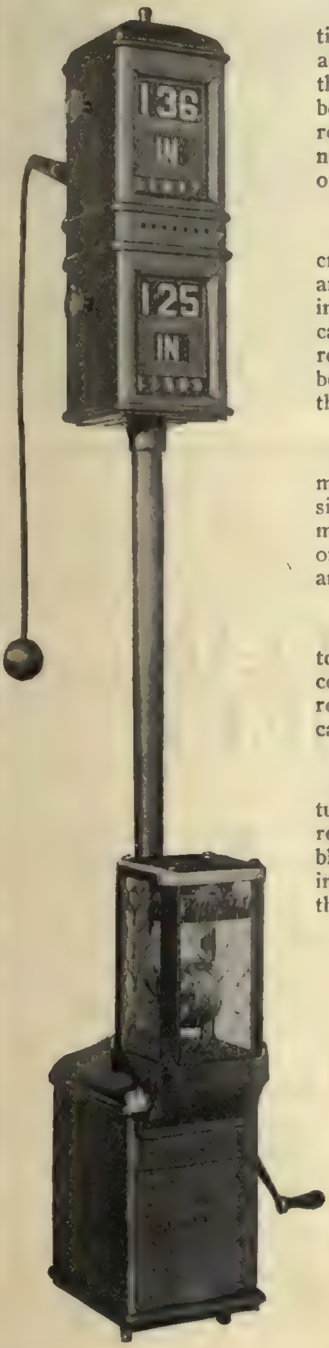
Its ease of application, its savings in roof painting costs, and its absolutely waterproof and fadeproof qualities are winning over many railways to Bayonne Roofing. Ask us for details.

Wide Cotton Duck—largest stock and assortment in United States. Also headquarters for cheesecloth and bunting.

JOHN BOYLE & CO., Incorporated
112-114 Duane Street New York City 70-72 Reade Street
Branch House, 202-204 Market St., St. Louis, Mo.

International C21

A Hand-Operated Combination Coin and Transfer Register for Single-End and Center-Entrance Cars



This compact combination replaces in single-end and center-entrance cars the use of separate fare boxes, car registers and register-operating mechanism, whether cords, rods or pedals and levers.

The same turn of the crank that counts in dollars and cents the cash deposited in the box also counts this cash in full fares on the register. There's no slip between the cup (box) and the lip (register)!

The conductor's work is made as simple as is possible in a hand-operated mechanism. He can't get one reading on the box and another on the register.

And the only cord he has to pull is the one that is connected to the transfer register directly over the cash register.

No aching shoulders from tugging frequently at high register cords, and no troubles due to passengers giving a stop signal by way of the register mechanism!

The
International
Register
Company

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Chicago, Ill.

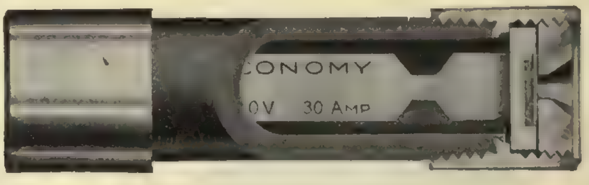
SAFETY ECONOMY renewable cartridge FUSES FIRST

Protect Cars and Power-plant

Don't trust to your more limited facilities for refilling fuses. As fuse specialists, we furnish reliable and carefully *tested Renewal Links* all ready to insert in

ECONOMY renewable cartridge FUSES

when they blow. These Links cost but a trifle and assure a complete break in the circuit at the required overload.



There's no need to use an extra new fuse every time one blows when the *efficient and safe* Economy fuse can be renewed over and over again with our *tested* Renewal Links at a saving of 80% of fuse maintenance expense under old-style, wasteful methods.

Write now for Bulletin No. 17 and our catalog.

Economy Fuse & Mfg. Co.
Kinzie and Orleans St.
Chicago, Ill.

The demand for our material is so great that we earnestly recommend our customers to anticipate their needs as much as possible.

STANDARD STEEL WORKS CO.

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St. Louis	London, Eng.
Pittsburgh	Melbourne, Aust.
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A minimum expense in equipment repairs is essential in the operation of all street and interurban railways. Wheel costs is an important item.

THE GRIFFIN F. C. S. WHEEL

is not only an economical wheel, but a safe one.

The chilled tread and flange insures minimum wear on brake shoes and rails, and maximum braking efficiency.

Many systems have installed wheel grinders in order to secure a maximum of mileage.

Literature pertaining to F. C. S. wheels and grinding wheels sent on application.

Our Large Output Insures Prompt Deliveries

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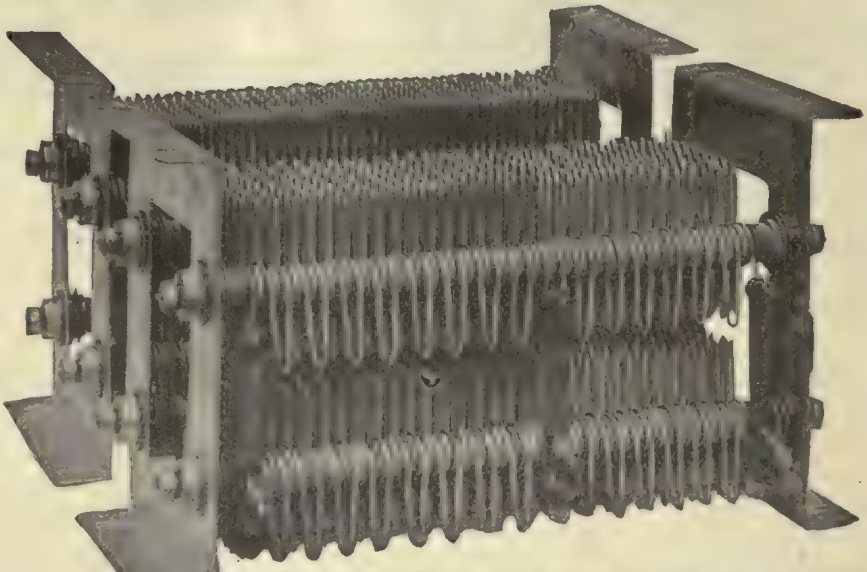
Trouble Cut to the Vanishing Point in

EMB Resistors



because a 100-grid EMB Resistor has only 3 or 4 joints where the different-sized grids are joined—whereas an ordinary 100-grid resistor of the cast single-grid type has 100 contact points.

In other words, there is just one twenty-fifth as much opportunity for trouble in the EMB as in the ordinary type.

THE ELLCON COMPANY
50 Church Street, New York

IF YOU WANT PROOFS

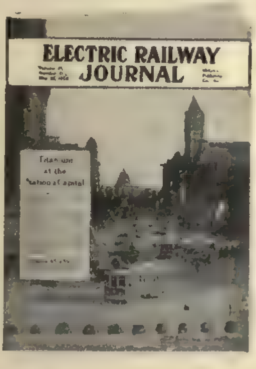
of your advertisements, and time to return them with corrections

Copy Must Be in Our Hands Two Weeks in Advance of Publication Date

Copy Changes. If no proofs are desired your advertisements should be in our hands Wednesday of the week preceding date of publication, otherwise your latest advertisement in accordance with schedule will be repeated.

New Advertisements (not changes of copy) can usually be accepted up to noon Wednesday of the week of publication, but no guarantee can be given as to location or proofs or indexing.

Searchlight Advertisements (Proposals, Wants, For Sale, etc.) received as late as 10 A. M. Thursday will be published if there is space available in the pages that go to press last. The paper is dated and mailed Saturday.



THESE are not arbitrary rules. We do our best to give our advertisers what they want—work overtime if necessary—but each advertising form has to be on the press at a specified time. That is why we cannot guarantee proof or location unless we have copy on time. We want our advertising space to work at maximum efficiency for our advertisers.

The Paper is dated and mailed Saturday

Electric Railway Journal, 239 W. 39th St., New York

To meet the requirements of its high class service—

The London & Port Stanley Railway

ordered

Jewett Steel Cars

one of which is shown above.
They are decidedly "cars of character."
Let us figure on *your* new requirement.

THE JEWETT CAR CO., Newark, Ohio

THE
CINCINNATI
CAR
COMPANY

WORKS:

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The St. Louis
Car Company

QUALITY SHOPS

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THE use of Kerite is the logical result of experience.

The *increasing* use of Kerite is the logical result of an increasing appreciation of the sound policy of using nothing but the best.

KERITE INSULATED WIRE & CABLE COMPANY
NEW YORK CHICAGO

STEEL POLES For every pole purpose

Bates Steel Poles in use by the DES MOINES CITY RAILWAY, Des Moines, Iowa, U. S. A.

Strongest STEEL POLE of like weight in the world.
Best STEEL POLE in the world for electric railway trolley service.
Most artistic STEEL POLE in the world for any service.
We make the lowest prices.
We have constantly on hand about two thousand tons of steel and can make immediate shipments.
A full line of convenient malleable fittings.
Our steel pole TREATISE tells a big story, ask for it.

BATES EXPANDED STEEL TRUSS CO.
208 South La Salle St., Chicago, Ill., U. S. A.

Aristos "COPPERWELD"—Copper Clad Steel Wire—
Beats Solid Copper 40 Ways
Cheaper—Lighter—Stronger—Higher Elastic Limit—Costs less to Maintain
GET DATA
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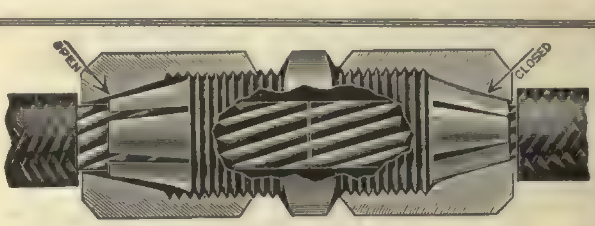
30 Church St., New York



Make Splices Easy to Open Up, Too

All you need is a wrench to open up a splice or make it up again, if you use

FRANKEL SOLDERLESS CONNECTORS

Wonderfully simple; Mechanically and electrically strong. Withstand big overloads. Get our booklet.

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Sales Rooms:
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AETNA INSULATION LINE MATERIAL
Third Rail Insulators, Trolley Bases, Poles, Harps and Wheels, Bronze and Malleable Iron Frogs, Crossings, Section Insulators, Section Switches.
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Established 1877.
Branches—New York, 135 B'way. Philadelphia, 429 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St. San Francisco, 613 Postal Telegraph Bldg. London, 48 Milton Street.

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Automatic Signals
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The Simmen System
DISPATCHER MOTORMAN
Direct Contact Between
Dispatcher and Motorman
Write for Details
SIMMEN AUTOMATIC RAILWAY SIGNAL CO.
1575 Niagara St., Buffalo, N. Y.

It Meets Every Requirement—The Celebrated
Trenton Trolley Wagon
J. R. McCARDELL & CO.
Patentees and Sole Manufacturers
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CONSULT OUR ENGINEERS ON YOUR SIGNAL REQUIREMENTS
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Western **"Good Poles Quick"** Northern

Quick Shipments from our Minneapolis Yard

Rooms 832-834, 72 West Adams St., Chicago, Ill.
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Butt Treating Open Tank and "Hot and Cold" Processes

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Railway Feeders

And all kinds of Electrical Conductors

Aluminum feeders are less than one-half the weight of copper feeders and are of equal conductivity and strength. If insulated wire or cable is required, high-grade insulation is guaranteed. Write for prices and full information.

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Cambric Cables
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Lamp Cord
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CUTS WOOD PRESERVING BILLS IN HALF
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The Barrett Company
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We brag about the SERVICE we give

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THE CARBOLINEUM FAMINE IS NOW PASSED

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It is made in America—by Americans, and for Americans.

It is "C-A-WOOD-PRESERVER" (Carbolineum-America)—the only Wood Preserver sold with a *quality affidavit* guaranteeing you superiority.

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NORTHERN WHITE CEDAR WESTERN RED CEDAR
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TREATED POLES, CROSS ARMS, TIES, TIMBERS, PAVING BLOCKS

CAPACITY 100,000,000 FEET B. M. PER ANNUM
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Crown
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On Ball, Web or Base—It's All One to the Lincoln System

—equally adapted for all these methods of bonding. The electric arc blends the copper of the bond and the steel of the rail into one structure, without in the least affecting the crystalline structure of the rail.

We want an opportunity to show you how to save from 20 to 50 cents on every bond you install.

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Fibre Track Insulation

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"I'll stake my reputation!"

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We know a certain Railroad Division Engineer who told his Chief Engineer that he would "stake his reputation" on the use of corrugated culverts—of proper thickness and quality.

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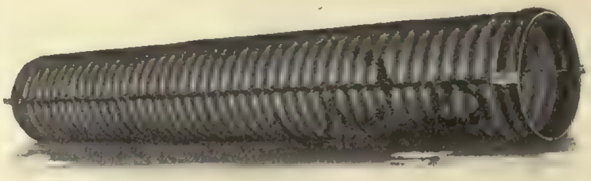

We are perfectly willing to tell bonafide inquirers just what railroads—Steam or Electric—are using and have been using "ACME" Culverts for years—in fact, to refer them to the users direct, if preferred. A special file of letters, orders, etc., in facsimile from Highway Engineers, Railroad Engineers, Government Engineers and various other interesting sources certainly covers the question convincingly. A copy?

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MANUFACTURERS
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Special Track Work

Built along quality lines withstand long, severe service.

Switches,
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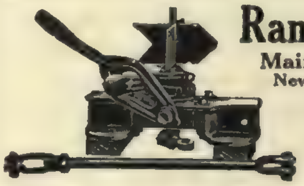

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Automatic Switch Stands,
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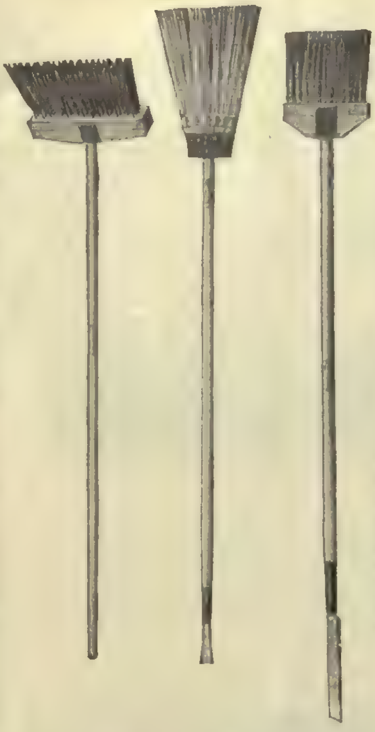
Tongue Switches, Mates, Frogs, Curves and Special Work of all kinds for Street Railways.

A Great Combination



No. 1 to sweep crossings.

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No. 1 and No. 3 contain Flat Steel Tempered Wire, and nothing superior can be produced. Serviceable all the year round. Your road is not complete without them.

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Steel for Service

This company makes different types of

Steel Cross Ties

suitable for all conditions in electric railway construction.

The mark of quality It protects the user

Carnegie Steel Company
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Repair Shop Machinery and Cranes

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RAISES the possibility of efficient stoking to a maximum.
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Circuit Breakers
for heavy street railway work are the best obtainable. Write for New Complete Catalogue.

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Insure uniform superheat at temperature specified
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An extra powerful and handy Jack for extra difficult jobs.

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This Jack can be worked from many angles to load, yet full lifting power is available from any position. Write for catalog, details and price.

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HIGHEST GRADE STANDARD OF QUALITY

Clear and Black Air Drying Insulating Varnishes
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We gladly assist in selection.

THE STERLING VARNISH COMPANY
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DIXON'S Graphite Brushes
overcome the scoring of commutators and the resulting noise and sparking.
If you have brush troubles, Booklet 108 M will be of interest to you.

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A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only Block that carries a five-year guarantee.

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KRANTZ SAFETY SWITCH PANELS

For Passenger Stations and Cars make handling of 500-600 volts circuits absolutely safe. Hundreds already installed on New York and Brooklyn systems. Let us submit design and quotation.

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Continuous Operation of the Power Plant

is a matter of extreme importance to the electric railway man. There must be no failure to supply the current when it is needed.

The constant use of Dearborn Treatment guarantees a high percentage of efficiency from the boilers. Made to suit the water conditions shown by analysis, it keeps the boilers free from scale, so that they steam freely and quickly, all corrosive or pitting action of the water is arrested, and, in fact, the boilers are in condition to yield their full quota of power constantly, while the fuel consumption is greatly reduced.

Send gallon of water for analysis, and let us advise regarding your plant requirements.

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Largest Makers of Oxy-Acetylene Welding and Cutting Equipment in the World.

Originators of the Oxweld Process

Full information on all classes of Welding and Cutting will be sent on request.

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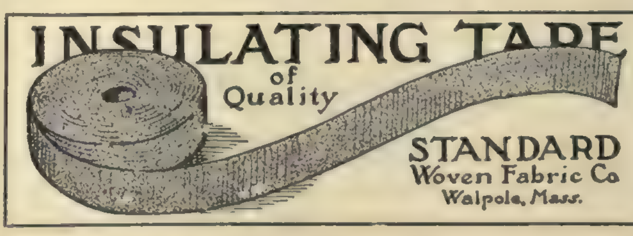
KINNEAR Steel Rolling Doors
FOR CAR HOUSES

Compact, Durable, Easily and Speedily Operated and Fireproof. Openings of any size may be equipped and the doors motor-operated if desired. Manufactured by the
KINNEAR MANUFACTURING CO., Columbus, Ohio
BOSTON PHILADELPHIA CHICAGO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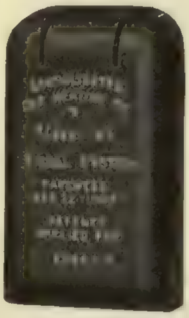
of
Quality

STANDARD
Woven Fabric Co
Walpole, Mass.

The Consolidated Safety Starting System



gives the motorman *positive notice* when all the doors of his car or train have been closed.

As a preventer of accidents due to boarding or alighting while cars are in motion, the Consolidated system holds first rank.

The motorman's signal light, shown here, has a green and a white light. Green is the normal starting-signal, the white being provided for additional safety.

Ask us to send you literature describing the whole Consolidated Line.

Consolidated Car-Heating Co.
New York Albany Chicago

SERVICE—

A much abused word that we interpret successfully.

We believe that "90% of all orders shipped same day received" is a good definition.

Try us on that requisition —NOW.

UNION ELECTRIC COMPANY
Electrical Headquarters
Terminal Warehouses Pittsburgh, Pa.

WE CAN CUT YOUR COST OF HEATING CURRENT

WRITE FOR THERMOSTATIC CONTROL INFORMATION

GOLD

- **ELECTRIC HEATERS** Cut Installation and Maintenance Charge.
- **VENTILATORS** Also Ventilate in Stormy Weather.
- **THERMOSTATS** Save Current.
- **ORIGINATED** the use of **NON-CORROSIVE** Wire for Electric Car Heaters.
- **ORIGINATED** The Ventilated Coil Support.

LET US FIGURE ON YOUR NEXT REQUIREMENTS

Gold Car Heating & Lighting Co., 17 Battery Pl., New York

Johnson Registering Fare Boxes

used in connection with the car register increase receipts $1.00 per car, per day, counts metal tickets the same as cash thus giving a positive check on all class of fares.

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U. S. Metal & Manufacturing Co.
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Cleveland Fare Box Co.
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For the Answer to your Fare Collection Problems
Write for
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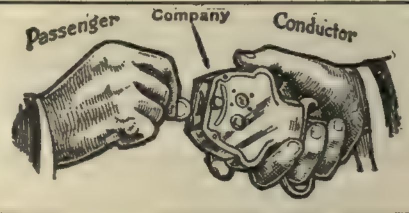
It tells how the
BONHAM TRAFFIC RECORDER
Will Meet Your Needs
The Bonham Recorder Co., Hamilton, Ohio



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By the
Passenger

Rooke Automatic Register Co.
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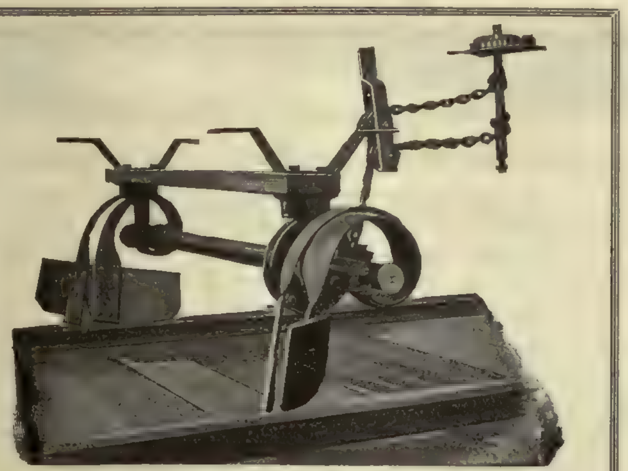

Snow Need Not Cripple You

if your cars are equipped with

Root Spring Scrapers

They clean the groove and rail so thoroughly that your schedule can be maintained regardless of a severe storm. Made in several sizes. Will fit any car. No. 6 is built for heavy snow removal work. It not only cleans the track but keeps it clean a safe distance on both sides of the track. No. 7 is especially adapted to low cars, and will work both forward and backward. Other types for every service. Get ready *now* for winter.

We can ship them promptly.

Root Spring Scraper Co., Kalamazoo, Mich.

4 to 6-In. Dia. ½ to ⅝-In. Wheel Axle

Do Your Winter Shopping Early

Do not wait for the first sleet storm to catch you unprepared. Order **Nuttall Sleet Wheels and Scrapers** now. Shipments from stock on orders placed now but we cannot guarantee them later.

Nuttall, Pittsburgh

This is the hub bearing of a HENSLEY Trolley Wheel after the rim is worn out.

HENSLEY Wheels require no bushing and maintain a perfect bearing in the hub until ready to be scrapped.

Our new catalog explains the merits of HENSLEY Wheels.

Our trial proposition proves these merits.

Hensley Trolley & Mfg. Co.
Detroit, Mich.

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.

THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

The Standard for Speed, Accuracy, Durability

B-V Visible Punch

Look for this
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124 Chambers Street
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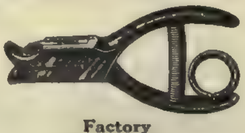

The Best Shade Rollers for Cars

SPECIAL shade rollers for cars, that will last and give satisfaction for years, and yet cost but little more than the poorest you can buy, are made by the Stewart Hartshorn Co., E. Newark, N. J. This company is by far the largest shade roller manufacturer in the world. It is able to give high quality at lower prices because of the enormous output. Write for catalog, stating wants. You are always protected when you buy shade rollers if they bear the signature Stewart Hartshorn

Have you our new

Trolley Wheel Bulletin

Write for your copy

The Eureka Company North East, Pa.

Ventilation—Sanitation—Economy—Safety

All Combined in

THE COOPER FORCED VENTILATION HOT AIR HEATER

Patented September 30, 1913. Ask for the full story.

We Also Manufacture Pressed Steel Hot Water Heaters

THE COOPER HEATER CO., CARLISLE, PA.

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FOR SALE

We have located at Fort Worth, Texas, the following:

10,556 lbs. 400,000 C.M., B. & S., bare copper cable, on six (6) reels of approx. 1760 lbs. each.

46,616 lbs. 500,000 C.M., B. & S., bare copper cable, on twenty-three (23) reels of approx. 2025 lbs. each.

8,919 lbs. No. 4/0 B. & S. grooved trolley wire, on three (3) reels of approx. 2500 lbs. each and one reel of 1400 lbs.

W. R. Kerschner Co., Inc.

50 Church St., New York City

ARCHER & BALDWIN

114-118 Liberty Street New York City

TELEPHONE 4337-4338 RECTOR

Rotary Converters, 25 Cycle

2—150 KW. General Electric type T. C., 4-150-750, 25 cycle, 3 phase, 575 volt, rotary converters, 750 r.p.m., complete with end play and speed limit device.

Rotary Converters, 60 Cycle

2—150 KW. Westinghouse 3 phase, 60 cycle rotary converters, 550 volts, 273 amps., 720 r.p.m., complete with 4—100 KW. Westinghouse Scott connected oil insulated transformers, 10,000/9500 volts prim., 430/362 volts secy.

Above will be sold with or without transformers.

Railway Motors

2—75 to 90 HP. Westinghouse No. 112 Railway Motors, newly rewound, practically new.

IMMEDIATE DELIVERY

MACGOVERN AND COMPANY
INC.

FRANK MACGOVERN, Pres. & Gen. Mgr.

114 LIBERTY STREET NEW YORK CITY

'Phone, 3375-3376 Rector

60 CYCLE ROTARY CONVERTERS

1 1000 KW. Gen. Elec., type HC, form P, 6 phase, 1667 amps., 600 volts D.C., 360 R.P.M.

3 300 KW. Gen. Elec., type HC, form P, 6 phase, 500 amps., 550 volts D.C., 900 R.P.M., with end play and speed limit device.

1 200 KW. Westinghouse, 3 phase, 600 volts D.C., 900 R.P.M., with starting motor.

550 VOLT DIRECT CURRENT UNIT

300 KW. Westinghouse, 550 volt, 145 R.P.M., dir. conn. to 16½" and 30½" x 30" Buckeye tandem engine.

Immediate Delivery

THIS IS OF NECESSITY ONLY A PARTIAL LIST—SEND FOR CATALOG

MOTOR WANTED

One—375 to 500 H.P., 440 volt, 3 phase, 60 cycle, 3 bearing, with sub-base and rails. Speed not over 580 r.p.m. Slip ring type for use with external resistance. Must be guaranteed for continuous duty at full load. Give full details in first letter.

Cape Girardeau Portland Cement Co.

Cape Girardeau, Mo.

Snap Bargain for Somebody! We Need the Room! If You Need An Engine and Generator or Steel Smoke Stack at Once, Read This!

FOR SALE

One Westinghouse 500 K. W. Generator, 360 volt, 3 phase, 25 cycle rotary field, direct connected to 750 H. P. Russell Tandem compound 4 valve engine. Size 23 x 40 x 30—125 R. P. M.

Space occupied by engine and generator:

32' 4" in length.
15' 6" in width.
Fly Wheel 14' diameter.
Face Wheel 16".

Equipment in fine condition and is not dismantled; can be inspected at plant in Alliance, Ohio.

Generator is in as good condition as when first installed and have Westinghouse Company inspection report confirming same.

Also have 125 feet steel stack, 6' diameter for sale. This stack is in 5 foot sections, ¼" boiler plate, in good condition.

WE NEED THE ROOM, and will sell cheap, or would consider exchange proposition of relaying 70 pound rails.

The Stark Electric R. R. Co.

Alliance, Ohio

CARS FOR SALE

OPEN and CLOSED
MOTOR and TRAIL

Write for Price and Full Particulars to

ELECTRIC EQUIPMENT CO.

Commonwealth Bldg. Philadelphia, Pa.

COMPLETE ARMATURES FOR SALE

FOR ALL THE STANDARD STREET RAILWAY MOTORS

GET OUR PRICE WE CAN SAVE YOU MONEY

America's Greatest Repair Works

CLEVELAND ARMATURE WORKS, Cleveland, O.

Get Your Wants into the Searchlight

Get your Wants into the Searchlight

ADVERTISING RATES

Under "Positions Wanted," including Salesmen looking for new connections, Evening Work Wanted, Side Line Wanted, etc., undisplayed advertisements cost **two cents a word,** minimum charge 50 cents an insertion, **payable in advance.**

Under "Positions Vacant," including Agents and Agencies Wanted, Representatives Wanted, Salesmen Wanted, Partners Wanted, Desk Room Wanted or For Rent, Business Opportunities, Employment Agencies, and Miscellaneous For Sale, For Rent, and Want ads; also Auction Notices, Receivers' Sales, Machinery and Plants For Sale or Wanted (with one line of display heading), undisplayed advertisements cost **three cents a word,** minimum charge $1.50 an insertion.

If replies are in care of any of our offices, allow five words for the address.

All advertisements for bids (Proposals) cost $2.40 an inch.

ADVERTISEMENTS IN DISPLAY TYPE

cost as follows for single insertions:

1/16 p. (1⅛x3⅜ ins.)	$5.00	1 in. (1x2 3/16 ins.)	$3.00
⅛ p. (2⅜x3⅜ ins.)	10.00	4 inches (4x2 3/16 ins.)	11.60
¼ p. (5x3⅜ or 2⅜x7 ins.)	20.00	8 inches (8x2 3/16 ins.)	22.40
½ p. (10¼x3⅜ or 5x7 ins.)	40.00	15 inches	40.50

1 page (10¼x7 ins.) 30 inches....$80.00

For space to be used within one year, to be divided to suit requirements of advertiser, provided some space is used in each issue following first insertion:

1 page	$80 a page	18 pages	$56 a page
3 pages	72 a page	26 pages	53 a page
6 pages	64 a page	40 pages	52 a page
12 pages	58 a page	52 pages	50 a page

In replying to advertisements, do NOT enclose original testimonials, drawings or photographs that you may want returned. Advertisements for men often produce several hundred applications and no employer can be expected to read all of these carefully and return the papers or applications of those in which he is not interested. State your experience and qualifications in as concise and neat a manner as possible and enclose COPIES of your testimonials.

When advertising machinery, use your own name and address—or a local address of some kind—so that the readers can wire direct and get quick replies. We advise also that you state in your advertisement the present location of plant that is offered for sale, or point of delivery provided you are in the market for equipment.

FOR SALE

A Metal Opportunity

Take advantage of the high prices of metal. We are cash buyers of all grades of scrap metal. Our specialty is buying electric plants, storage battery plants, storage battery plates and sediment. We buy small lots as well as large lots. Write us and tell us what you have and we will be pleased to quote you prices. National Metal & Rubber Co., 30-31 India Wharf, Boston, Mass.

Snow Plow for Sale

Single track, detachable iron snow plow; never been placed in service; photograph and full description on application. This plow capable of handling heavy drifts and is of first class construction throughout. The Trinidad Electric Transmission Railway & Gas Company, Trinidad, Colo.

Engine for Sale

One horizontal McIntosh & Seymour tandem compound condensing engine, 11 in. and 20 in. x 30 in., 240 I.H.P., at one-third cut off; 300 I.H.P. at one-half cut off; 125 lb. steam pressure; 26 in. vacuum. Flywheel, weight 13,000 lb.; 32 in. face, 11 ft. diam. This engine is in first class operating condition and could be shipped immediately. The American Railways Company, Witherspoon Bldg., Philadelphia.

RAILS

1500 tons 60 lb. Good
600 tons 56 lb. Good
500 tons 40 lb. New
600 tons 30 lb. Good
300 tons 25 lb. Good

OR ANY SECTION—NEW OR RELAY

Before buying
LOCOS., CARS, EQUIPMENT, MACHINERY, TANKS
See what Bargains can be obtained from

ZELNICKER IN ST. LOUIS

423 First Nat. Bk., Chicago
910 Hennen Bldg., New Orleans

Get Your Wants into the Searchlight

MISCELLANEOUS WANTS

Motors Wanted

We are in the market for several A.C. and D.C. motors, and also some plating dynamos, any size or make. Write us what you have to offer. Schwartz & Land, 207 Centre St., New York City.

BUSINESS OPPORTUNITIES

Corporation Requires Financing

Public utility corporation requires financing. Opening for a man, firm or banking concern with knowledge of handling securities of power, light, traction and freight properties and engineering reports. Must control capital and be ready to assume active interest in the company. Full particulars to *principals only.* References required. Box 1233, Elec. Ry. Jour., 935 Real Estate Trust Bldg., Philadelphia, Pa.

POSITIONS WANTED

ACCOUNTANT, age 25, married, graduate of high school and business course, five years' experience in steam and electric railway offices, desires position as auditor receipts or traveling auditor with good prospect for advancement. Have good references. Box 948, Elec. Ry. Jour.

CIVIL engineer desires position as maintenance of way engineer. At present employed in like position and also as electrical engineer. Technical graduate, with 8 years' practical experience. Box 1234, Elec. Ry. Jour.

GENERAL manager electric railway and lighting properties open for position. Twenty years' experience handling properties for large banking concern. Box 1236, Elec. Ry. Jour., 935 Real Estate Trust Bldg., Philadelphia, Pa.

GENERAL manager experienced in all branches of street railway business, especially legislative and preliminary work connected with development of new propositions, wishes to make change. Can get results by up-to-date methods. Best references. Box 1232, Elec. Ry. Jour.

POSITIONS WANTED

HIGH school graduate, accounting N. Y. U. Five years' experience stores department of large Eastern street railway company. At present storekeeper of large division. Wishes to make change. Box 1239, Elec. Ry. Jour.

POSITION wanted as street railway superintendent by man with 20 years' experience. Have had training in all departments. Box 1246, Elec. Ry. Jour.

POSITION as superintendent or assistant to general manager. Have had 18 years' experience on electric and steam roads as inspector, dispatcher, assistant superintendent, etc. Am now employed on one of the largest interurban and city lines. Am able to install safest system of dispatching. Best of reference as to ability, character, etc., from present employer. Box 1243, Elec. Ry. Jour.

PURCHASING agent, age 32, married, 10 years with one of the largest street railways in the United States; now filling this capacity in the automobile industry; desires to return to the traction field. Thoroughly familiar with modern purchasing methods. Salary $2,000. Box 1241, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT wishes position on small road, 16 years' experience electric railroads, 5 years superintendent of transportation, track and over-head on 30 mile road. Best of references. Box 1240, Elec. Ry. Jour.

WANTED, by young man, position as superintendent or assistant to general superintendent of city or interurban line. Am familiar with the operation of high speed single track interurban systems. Box 1247, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

YOUNG man, six years in executive offices large Eastern street railway and lighting company. Now law clerk legal department. College graduate; member of bar. Can handle legal and claim work. Good assistant to busy executive. Box 1223, Elec. Ry. Jour., 935 Real Estate Trust Bldg., Philadelphia, Pa.

POSITIONS VACANT

COACH painter wanted, one competent to take full charge and do all kinds of coach work. Permanent position to competent man. Box 1245, Elec. Ry. Jour.

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

More than 300 different products are here listed. The Alphabetical Index (see eighth page following) gives the page number of each advertisement.

As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.

If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will promptly furnish the information.

Acetylene Apparatus. (See Cutting Apparatus, Oxy-Acetylene.)

Acetylene Service.
Prest-O-Lite Co., Inc.
Oxweld Acetylene Co.

Advertising, Street Car.
Collier, Inc., Barron G.

Air Cleaners.
Lord Mfg. Co.

Air Rectifiers.
Lord Mfg. Co.
National Safety Device Co.

Alloys and Bearing Metals. (See Bearings and Bearing Metals.)

Alloys, Steel and Iron.
Titanium Alloy Mfg. Co.

Anchors, Guy.
Electric Service Supplies Co.
Holden & White.
Johns-Manville Co., H. W.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Automobiles and Buses.
Brill Co., The J. G.

Axle Straighteners.
Columbia M. W. & M. I. Co.

Axles, Car Wheel.
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Cincinnati Car Co.
St. Louis Car Co.
Standard Steel Works Co.
Westinghouse Elec. & M. Co.

Babbitting Devices.
Columbia M. W. & M. I. Co.

Badges and Buttons.
Electric Service Supplies Co.
International Register Co., The

Bankers and Brokers.
National City Co.
Redmond & Co.

Batteries, Dry.
Johns-Manville Co., H. W.

Batteries, Storage.
Electric Storage Battery Co.

Bearings and Bearing Metals.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
More-Jones Brass & M. Co.
St. Louis Car Co.
Westinghouse Elec. & M. Co.

Bearings, Center.
Baldwin Locomotive Works.

Bearings, Roller and Ball.
Gurney Ball Bearing Co.
Railway Roller Bearing Co.

Bearings, Roller Side.
Holden & White.

Bells and Gongs.
Brill Co., The J. G.
Electric Service Supplies Co.
St. Louis Car Co.

Benders, Rail.
Niles-Bement-Pond Co.
Zelnicker Sup. Co., W. A.

Blow Torches for Soldering and Brazing. (See Cutting Apparatus, Oxy-Acetylene.)

Blowers.
General Electric Co.
Westinghouse Elec. & M. Co.

Boilers.
Babcock & Wilcox Co.

Boiler Cleaning Compounds.
Dearborn Chemical Co.
Johns-Manville Co., H. W.

Boiler Coverings.
Johns-Manville Co., H. W.

Bond Clips.
Electric Railway Improve. Co.

Bond Testers.
American Steel & Wire Co.

Bonding Apparatus.
Electric Railway Improve. Co.
Ohio Brass Co.
Oxweld Acetylene Co.
Prest-O-Lite Co., Inc.

Bonding Tools.
American Steel & Wire Co.
Electric Railway Improve. Co.
Electric Service Supplies Co.
Ohio Brass Co.

Bonds, Rail.
American Steel & Wire Co.
Electric Railway Improve. Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Ohio Brass Co.
Union Electric Co.
Westinghouse Elec. & M. Co.

Bonds Welded.
Lincoln Bonding Co.

Book Publishers.
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel.
Niles-Bement-Pond Co.

Braces, Rail.
Kilby Frog & Switch Co.

Brackets and Cross Arms. (See also Poles, Ties, Posts, Etc.)
American Bridge Co.
Bates Expanded Steel Truss Co.
Electric Service Supplies Co.
Int'l Creosoting & Constr. Co.
Lindsley Bros. Co.
Ohio Brass Co.
Union Electric Co.

Brake Adjusters.
Smith-Ward Brake Co.

Brake Shoes.
Amer. Brake Shoe & Fdy. Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Long Co., E. G.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Holden & White
Long Co., E. G.
Lord Mfg. Co.
National Brake Co.
National Safety Device Co.
St. Louis Car Co.
Westinghouse Trac. B. Co.

Bridges and Buildings.
American Bridge Co.

Brooms, Track, Steel or Rattan.
Paxson, J. W.
Zelnicker Sup. Co., W. A.

Brush Holders.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Brushes, Carbon.
Dixon Crucible Co., Jos.
General Electric Co.
Jeandron, W. J.
Morgan Crucible Co.
Westinghouse Elec. & Mfg. Co.

Bumpers, Car Seat.
Electric Service Supplies Co.

Bunkers, Coal.
American Bridge Co.

Bunting.
Boyle & Co., Inc., John.

Bushings, Case Hardened and Manganese.
Bemis Car Truck Co.

Bushings, Fibre.
Diamond State Fibre Co.

Buttons. (See Badges and Buttons.)

Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.)

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc.—(See those headings.)

Car Panel Safety Switches.
Krantz Mfg. Co.

Car Trimmings. (For Curtains, Registers, Doors, Seats, etc., see those headings.)

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cincinnati Car Co.
Jewett Car Co.
Kuhlman Car Co., G. C.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Second Hand.
Electric Equipment Co.

Cars, Self-Propelled.
Electric Storage Battery Co.
General Electric Co.

Car Stops, Automatic.
Consolidated Car-Heating Co.

Castings, Brass.
Frankel Connector Co.
More-Jones Brass & M. Co.

Castings, Composition or Copper.
Anderson Mfg. Co., A. & J. M.

Castings, Gray Iron and Steel.
Amer. Brake Shoe & Fdry. Co.
American Bridge Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Long Co., E. G.
St. Louis Car Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.

Castings, Malleable and Brass.
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Long Co., E. G.
St. Louis Car Co.

Catchers and Retrievers, Trolley.
Electric Service Supplies Co.
Holden & White.
Long Co., E. G.
Lord Mfg. Co.
Ohio Brass Co.
Union Electric Co.
Wood Co., Chas. N.

Ceiling, Car. (See Headlining.)

Charging Sets, Storage Battery.
General Electric Co.

Cheese Cloth.
Boyle & Co., Inc., John.

Chemists.
Little, Inc., Arthur D.

Circuit Breakers.
Cutter Electrical & Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Clamps.
Frankel Connector Co.

Clamps and Connectors for Wires and Cables.
Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co.
Frankel Connector Co.
General Electric Co.
Klein & Sons, Mathias.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Cleaners and Scrapers, Track. (See also Snow-Plows, Sweepers and Brooms.)
Brill Co., The J. G.
Cincinnati Car Co.
Ohio Brass Co.
Root Spring Scraper Co.
Van Dorn & Dutton Co.

Cleats, Car Wiring.
General Electric Co.

Clusters and Sockets.
General Electric Co.

Coal and Ash Handling. (See Conveying and Hoisting Machinery.)

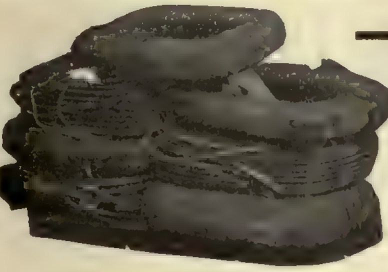
Coasting Clocks.
Railway Improvement Co.

Coil Banding and Winding Machines.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Coils, Armature & Field.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Independent Lamp & Wire Co.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coin-Counting Machines.
International Register Co., The
Johnson Fare Box Co.



—This Is False Economy

Old coils are old coils because of the insulation—not because of the copper. The copper is 100% pure—too high grade for casting purposes—too high priced to sell as scrap.

Independent Treatment Is True Economy

It makes out of an old coil a new one of similar characteristics, but better in point of insulation. That is because Salamander Pine Asbestos is used—for asbestos insulated coils can be impregnated at a temperature that would destroy cotton insulated coils.

Independent Treatment includes our highly developed processes, modern appliances, and skilled labor—all at a trifling price—merely that of the actual insulation used.

Better write for our proposition today or send a few old coils for demonstration.

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Offices: 1737 Broadway, New York
FACTORIES: York, Pa., and Weehawken, N. J.

Model 341
A. C. and D. C.
Portable
Voltmeter

The Art of Electrical Measurement, its perfection and its growth, have been associated inseparably with this name—

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From the year 1888 to now, each successive instrument that has borne the name has marked the highest achievement in the Art.

At no time has Weston superiority been more obvious than in the present models.

Weston Indicating Instruments include a great variety of groups for portable or switchboard service on A.C. or D.C. Circuits, Instruments designed expressly for testing and laboratory use, for motor car and boat electrical systems, and many others for special purposes. Write for Bulletins or Catalogs describing those which interest you.

The Weston Portable Electrodynamometer Group includes Model 310 Single Phase Wattmeter, Model 329 Polyphase Wattmeter, Model 341 A.C. and D.C. Voltmeter and Model 370 A.C. and D.C. Ammeter.

The characteristics of the group are extreme accuracy (guaranteed within a fraction of 1% full scale value), adaptability for use on circuits of any commercial frequency and any wave form, great overload capacity, low moment of inertia, effective damping and shielding, and the legibility and remarkable uniformity of the hand calibrated scales.

Weston Electrical Instrument Co., 21 Weston Ave., Newark, N. J.

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If it has
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on it,
Proceed in Safety.
If Not,
Be Careful

Universal Safety Tread Co., Waltham, Mass.

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Rectifier for Frozen Air Pipes.
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Special Agents for
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- Johnson Fare Box Co.
- C. & C. Electric & Mfg. Co.
- Holden & White

General Agents for Anglo-American Varnish Co.
Eastern Agents for Union Fibre Co.
Southern and New England Agents for Thayer & Co.

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Commutator Slotters.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Wood Co., Chas. N.

Commutator Truing Devices.
General Electric Co.

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Cleveland Armature Works.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
Westinghouse Elec. & M. Co.

Compressors, Air.
General Electric Co.
Westinghouse Trac. B. Co.

Condensers.
General Electric Co.
Westinghouse Elec. & M. Co.

Conduits, Underground.
Johns-Manville Co., H. W.

Connectors, Solderless.
Frankel Connector Co.

Controller Fingers.
Lord Mfg. Co.

Controller Handles.
Lord Mfg. Co.

Controller Regulators.
Electric Service Supplies Co.

Controllers or Parts.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Eureka Co.
General Electric Co.
Johns-Manville Co., H. W.
Kerschner, W. R.
Westinghouse Elec. & M. Co.

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General Electric Co.
Westinghouse Elec. & M. Co.

Converters, Rotary.
General Electric Co.
Westinghouse Elec. & M. Co.

Conveying and Hoisting Machinery.
American Bridge Co.
Green Engrg. Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The.
Long Co., E. G.
Roebling's Sons Co., John A.
Samson Cordage Works.

Cord Connectors and Couplers.
Electric Service Supplies Co.
Samson Cordage Works.
Wood Co., Chas. N.

Cotton Duck.
Boyle & Co., Inc., John.

Couplers, Car.
Brill Co., The J. G.
Cincinnati Car Co.
Long Co., E. G.
Ohio Brass Co.
Van Dorn Coupler Co.
Westinghouse Trac. B. Co.

Cranes. (See also Hoists.)
Niles-Bement-Pond Co.
Van Dorn & Dutton Co.

Creosoting. (See Wood Preservatives.)

Cross Arms. (See Brackets.)

Crossing Foundations.
International Steel Tie Co.

Crossing Signals. (See Signals, Crossing.)

Crossings, Track. (See Track, Special Work.)

Culverts.
American Rolling Mill Co.
Bark River B. & Culvert Co.
California Cor. Culvert Co.
Canton Culvert & Silo Co.
Coast Culvert & Flume Co.
Corrugated Culvert Co.
Delaware Metal Culvert Co.
Dixie Culvert & Metal Co.
Hardesty Mfg. Co., R.
Illinois Corrugated Metal Co.
Independence Cor. Culvert Co.
Iowa Pure Iron Culvert Co.
Kentucky Culvert Mfg. Co.
Lee-Arnett Co.
Lone Star Culvert Co.
Lyle Corrugated Culvert Co.
Michigan Bridge & Pipe Co.
Montana Culvert Co.
Nebraska Culvert & Mfg. Co.
Nevada Metal Mfg. Co.
New England Metal Cul. Co.
North East Metal Co.
Northwestern Sheet & I. Wks.
O'Neill Co., W. Q.
Ohio Corrugated Culvert Co.
Pennsylvania Metal Cul. Co.
Road Supply & Metal Co.
Sioux Falls Metal Cul. Co.
Spokane Corr. Cul. Co.
Tennessee Metal Culvert Co.
Utah. Corr. Culvert & Flume Co.
Virginia Metal & Culvert Co.
Western Metal Mfg. Co.
Wyatt Mfg. Co.

Curtains and Curtain Fixtures.
Brill Co., The J. G.
Electric Service Supplies Co.
Hartshorn Company, Stewart.
Pantasote Co., The.
St. Louis Car Co.

Cutting Apparatus, Oxy-Acetylene.
Oxweld Acetylene Co.
Prest-O-Lite Co., Inc.

Derailing Devices. (See also Track Work.)
Cleveland Frog & Crossing Co.

Despatching Systems.
Simmen Automatic Ry. Sig. Co.

Destination Signs.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Detective Service.
Wisch Service, P. Edward.

Door Operating Devices.
Consolidated Car-Heating Co.

Doors, Asbestos.
Johns-Manville Co., H. W.

Doors and Door Fixtures.
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General Electric Co.
Hale & Kilburn Co.

Doors & Shutters, Fireproof.
Kinnear Mfg. Co.

Doors, Steel Rolling.
Kinnear Mfg. Co.

Draft Rigging. (See Couplers.)

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American Steel & Wire Co.
Electric Service Supplies Co.
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Niles-Bement-Pond Co.
Ohio Brass Co.

Dryers, Sand.
Electric Service Supplies Co.
Zelnicker Sup. Co., W. A.

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Arnold Co., The.
Burch, Edw. P.
Byllesby & Co., Inc., H. M.
Ford, Bacon & Davis.
Gulick-Henderson Co.
Hunt & Co., Robert W.
Jackson, D. C. & Wm. B.
Little, Inc., Arthur D.
Richey, Albert S.
Roosevelt & Thompson.
Sanderson & Porter.
Scofield Engineering Co.
Stone & Webster Eng. Corp.
White Companies, J. G.
Woodmansee & Davidson, Inc.

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Westinghouse Elec. & M. Co.

Engines, Steam.
Westinghouse Elec. & M. Co.

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Brill Co., The J. G.
Cleveland Fare Box Co.
Internat'l Register Co., The.
Johnson Fare Box Co.

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Fencing Wire.
American Steel & Wire Co.
Page Woven Wire Fence Co.

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Brill Co., The J. G.
Cincinanti Car Co.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Electric Service Supplies Co.
Lord Mfg. Co.
Root Spring Scraper Co.
Star Brass Works.

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Diamond State Fibre Co.
Westinghouse Elec. & M. Co.

Fibre Insulation.
U. S. Metal & Mfg. Co.

Fibre Tubing.
Diamond State Fibre Co.
Johns-Manville Co., H. W.
Westinghouse Elec. & M. Co.

Field Coils. (See Coils.)

Fire Extinguishing Apparatus.
Johns-Manville Co., H. W.

Fireproofing Materials.
Johns-Manville Co., H. W.

Flooring Composition.
American Mason Safety Tread Co.

Forgings.
Standard Steel Works Co.

Frogs, Track. (See Track Work.)

Furnaces. (See Stokers.)

Fuses and Fuse Boxes.
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D & W Fuse Co.
Daum, A. F.
General Electric Co.
Johns-Manville Co., H. W.
Westinghouse Elec. & M. Co.

Fuses, Refillable.
Columbia M. W. & M. I. Co.
Economy Fuse & Mfg. Co.
General Electric Co.

Gaskets.
Diamond State Fibre Co.
Johns-Manville Co., H. W.
Power Specialty Co.

Gas Producers.
Westinghouse Elec. & Mfg. Co.

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Brill Co., The J. G.
Cincinnati Car Co.
Jewett Car Co.

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Ohio Brass Co.

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Carnegie Steel Co.
Diamond State Fibre Co.
Standard Steel Works Co.

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Electric Service Supplies Co.
Kerschner, W. R.
U. S. Metal & Mfg. Co.
Westinghouse Elec. & M. Co.

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Columbia M. W. & M. I. Co.
Diamond State Fibre Co.
Electric Service Supplies Co.
General Electric Co.
Kerschner, W. R.
Long Co., E. G.
Nuttall Co., R. D.
Union Electric Co.
U. S. Metal & Mfg. Co.
Van Dorn & Dutton Co.

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General Electric Co.

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General Electric Co.
Westinghouse Elec. & M. Co.

Generators, Direct Current.
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Westinghouse Elec. & M. Co.

Gongs. (See Bells and Gongs.)

Graphite.
Dixon Crucible Co., Joseph.
Morgan Crucible Co.

Greases. (See Lubricants.)

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Railway Track-work Co.

Guards, Cattle.
American Bridge Co.

Guards, Trolley.
Electric Service Supplies Co.
Ohio Brass Co.

Harps, Trolley.
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Electric Service Supplies Co.
Hensley Trolley & Mfg. Co.
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Nuttall Co., R. D.
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Ohio Brass Co.
St. Louis Car Co.
Union Electric Co.
Westinghouse Elec. & M. Co.

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Heaters, Car (Electric).
Consolidated Car-Heating Co.
Gold Car Heating & Lighting Co.
Smith Heater Co.

Heaters, Car, Hot Air.
Cooper Heater Co.
Smith Heater Co., Peter.

Heaters, Car, Hot Water.
Cooper Heater Co.
Smith Heater Co., Peter.

Heaters, Car, Stove.
Electric Service Supplies Co.
Smith Heater Co., Peter.

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Duff Mfg. Co.
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Patten Co., P. B.
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Hose Bridges.
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Hose, Pneumatic & Fire.
Johns-Manville Co., H. W.

Hydraulic Machinery.
Niles-Bement-Pond Co.

Hydrogrounds.
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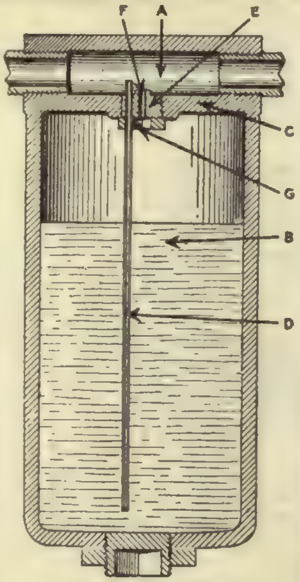
Study the Simplicity of Construction and Operation



Cross Sectional View

This rectifier quickly installed in the air line of a car supplies just the right amount of alcohol vapor to keep the moist air from freezing and to remove any formation of gum or oil in the air system.

Yet there are no moving parts—nothing to get out of order—nothing to wear out.

A, the air line, and *B*, the alcohol container, are separated by the wall *C*. In service or emergency application the air pressure in the main line is momentarily reduced. As the air of the container instantaneously equalizes with the pressure in the air line a predetermined amount of alcohol spray or vapor is carried throughout the air system.

This device properly installed on your cars means freedom from frozen air and facilitates positive operation of air controlled mechanisms.

Send for Further Information

National Safety Device & Man'f'g Co.
CHICAGO, ILL.
Sole Eastern Electric Railway Agent
Lord Manufacturing Co., New York

It is a fact proved beyond peradventure of a doubt that

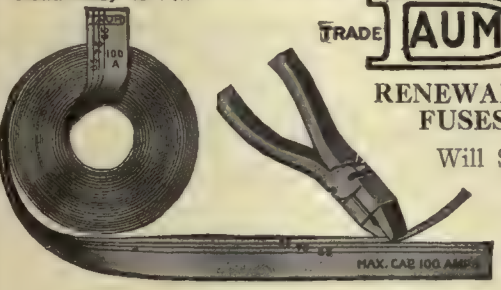
"Imperial" Tie Tampers

are effecting for many railways, better riding track, more stable track, with less labor, and at a considerably lower cost.

Ask for a Copy of Bulletin 9023

Ingersoll-Rand Company
11 Broadway, New York

Dead Easy to Fill



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RENEWABLE FUSES

Will Save You Money

Free Sample

A. F. DAUM
Sole Manufacturer, Pittsburgh, Pa.
Maker of the First Successful Refillable Fuse on the Market

TULC

MANY SYSTEMS ARE USING TULC

after first making most thorough tests under all conditions. Such tests have shown that it will cut lubrication costs in half.

THE UNIVERSAL LUBRICATING CO.
Schofield Building CLEVELAND, O.

The "Hycap-Exide" Battery
for
STORAGE BATTERY STREET CARS
THE ELECTRIC STORAGE BATTERY CO
PHILADELPHIA

"Boyerized" Products Reduce Maintenance

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- Case Hardened Brake Pins
- Case Hardened Bushings
- Case Hardened Nuts and Bolts
- Manganese Brake Heads
- Manganese Transom Plates
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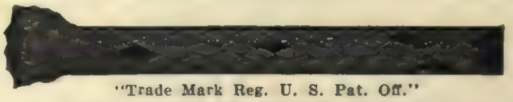

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Printing begins on Tuesday of each week.

Changes of copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for OK before publication.

New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.

If proofs before printing are required, change of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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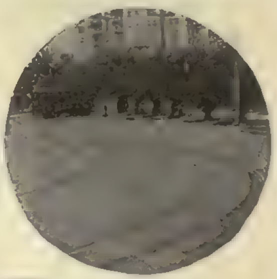

Broadway Looking South from Sixth Street

The Heavy Traffic Street of Los Angeles

Titanium Treated Rail

On the Pacific Coast

Do you know that both San Francisco and Los Angeles are liberal users of Titanium-treated rails? Also that the Oakland, Antioch & Eastern Railway is a Titanium interurban?

The famous curves at Market Street ferry in San Francisco and the tangents on the hardest-worked Broadway track in Los Angeles are Titanium-treated.

These Pacific Coast companies were among the first to appreciate the manifest merits of Titanium-treatment.

Titanium-treatment assures you a flawless, longer-lived rail, whether for curves or tangents, whether for city or interurban operation.

You will never regret writing it into your rail specifications!

TITANIUM ALLOY MANUFACTURING COMPANY

Operating Under Rossi Patents

Processes and Products Patented

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Niagara Falls, N. Y.

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Reg. U. S. Pat. Off.
TRADE MARK.

Pittsburgh Office: Oliver Building
Chicago Office: Peoples Gas Building

New York Office: 15 Wall Street

AGENTS:

Pacific Coast: ECCLES & SMITH CO., Los Angeles, San Francisco, Portland
Great Britain and Europe: T. ROWLANDS & CO., Sheffield, England

VIEW OF TRUCK EQUIPPED WITH ROLLER BEARINGS

ROLLWAY BEARINGS

An Illuminating Summary

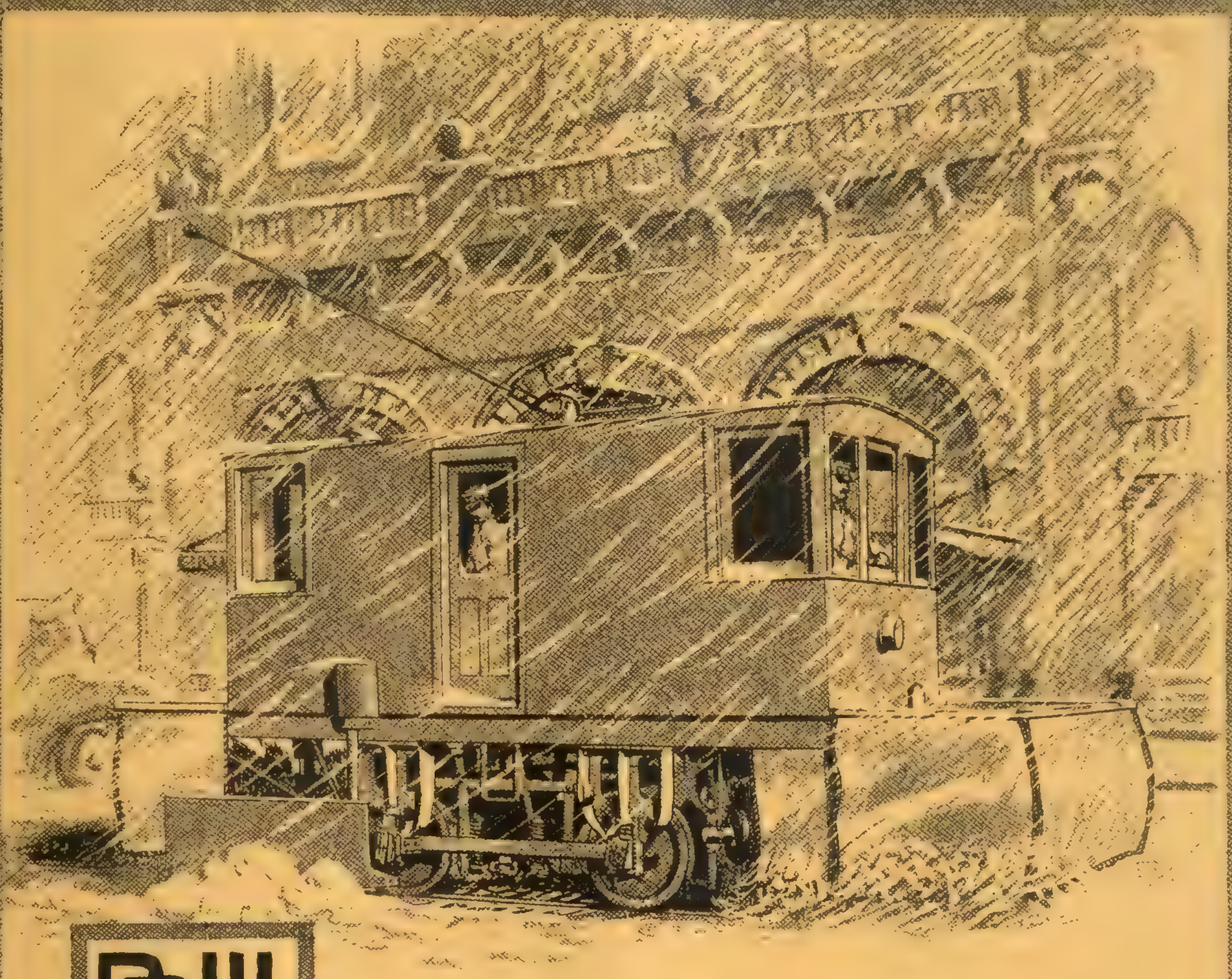
"Summing up the situation in regard to roller bearings, some of the advantages of their use may be enumerated as follows: Decrease of power, especially at peaks and during acceleration; more coasting; low lubrication and maintenance costs; reduced axle fractures; reduced pull-ins; fewer cars needed, reducing the investment, and possible adoption of smaller motors, and, therefore, less waste.

"The reduced energy demand means, in addition, wear on trolley wire and trolley wheels. With bearings of the anti-friction type, the axles are kept in the exact alignment, while with plain bearings there is considerable lost motion due to journal brass movement in the journal boxes, and to the ends of the journal being pushed to one side of the journal brass. With the anti-friction bearings there is also a reduction in brakeshoe and wheel wear. A car equipped with these bearings will coast further than one with plain bearings, and will accelerate at a higher rate with the same current."

(From an article entitled "Results Obtained with Roller Bearings on Interurban Cars" by W. B. Voth and A. C. Metcalfe, respectively Chief Engineer and Master Mechanic Empire United Railways, Inc., Syracuse, N. Y.)

Think it over

The Railway Roller Bearing Co.
SYRACUSE, N. Y.



BRILL

Gear-Drive Snow Sweepers are a long stride in advance of the sprocket-and-chain type in that the number of wearing parts is reduced to a few, and each of these is provided with large phosphor bronze bearings and ample means for lubrication. The motor for driving the brooms is located at the center of the cab and has propeller shafts extending to the broom shafts and connecting with bevel gears enclosed and running in lubricant. A simple and efficient clutch on each propeller shaft is operated by a conveniently located lever—one lever for both clutches—and like all the rest of the mechanism is of extra sturdy construction to stand rough handling and severe service conditions. The steel wing for leveling the snow at the side is improved both as to strength of construction and means of rapid adjustment and, all in all, this powerful snow fighting machine is mechanically modernized to work hard and fast and keep in trim.

THE J. G. BRILL COMPANY, PHILADELPHIA, PA.
AMERICAN CAR COMPANY, ST. LOUIS, MO.
G. C. KUHLMAN CAR COMPANY, CLEVELAND, OHIO
WASON MANUFACTURING COMPANY, SPRINGFIELD, MASS.

Over 15,000 C P Compressors

OVER 15,000 CP COMPRESSORS

are now in service.

The results: reduced maintenance costs and greater reliability of air brake equipments are known to most everyone in the railway industry.

The CP type of compressor is the standard of excellence for all classes of electric railway service.

6461

General Electric Company

General Offices:
Schenectady, N. Y.

Sales Offices
in all large cities

New Steel Interurban Car for Northern Ohio

ELECTRIC RAILWAY JOURNAL

New York, November 18, 1916 McGraw Publishing Co. Inc. Vol. 48, No. 21 10c a copy

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Titanium-Treated Rails
the Standard for Heavy Service

It is significant that Titanium-Treated Rails are in extensive use on the following electric railway systems of the United States:

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Los Angeles Railway
Oakland, Antioch & Eastern Railway
United Railways of St. Louis
Pittsburgh Railways
Brooklyn Rapid Transit System
Cleveland Railway
Philadelphia Rapid Transit Company
Capital Traction Company
Boston Elevated Railway
Bay State Street Railway

Titanium-Treated Rails should be the only ones to consider wherever track is laid and used under severe conditions.

Titanium Alloy Mfg. Co.
Niagara Falls, N. Y.

TPC
Reg. U. S. Pat. Off.
TRADE MARK

Westinghouse

No 548

95 Horsepower—Weight 3125 lbs.

Our Standard

For High-Speed Interurban Service

Combines light weight with high service capacity. Gives entire satisfaction in service formerly requiring a heavy motor equipment of 100 horsepower or greater.

Perfect commutation is secured with correctly proportioned commutating poles, main fields and armature.

The light weight also means greater economy in maintenance of roadway, car bodies, trucks, etc.

W
WESTINGHOUSE ELECTRIC

We have a Standard Motor for every service

Leaflet 3836 gives details Ask nearest office for a copy

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Chicago, Ill.
Cincinnati, Ohio
Cleveland, Ohio
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*Dallas, Tex.
Dayton, Ohio
Denver, Colo.
Des Moines, Iowa
Detroit, Mich.
Duluth, Minn.
*El Paso, Tex.
*Houston, Tex.
Indianapolis, Ind.
Joplin, Mo.
Kansas City, Mo.
Louisville, Ky.
Los Angeles, Cal.
Memphis, Tenn.
Milwaukee, Wis.
Minneapolis, Minn.
New Orleans, La.
New York, N. Y.
Omaha, Neb.
Philadelphia, Pa.
Pittsburgh, Pa.
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Wilkes-Barre, Pa.
*W. E. & M. Co. of Texas

ELECTRIC RAILWAY JOURNAL

VOLUME XLVIII, No. 21 NEW YORK, NOVEMBER 18, 1916 PAGES 1047 TO 1088

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JAMES H. MCGRAW, President. A. E. CLIFFORD, Secretary. J. T. DE MOTT, Treasurer. H. W. BLAKE, Editor.
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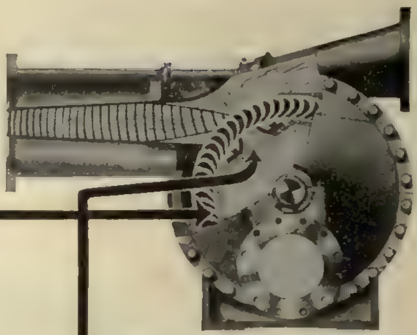
The Pump Runner
is very rugged.



The opening admitting
water to the runner
is large.

The Westinghouse Leblanc Air Pump

WESTINGHOUSE ELECTRIC

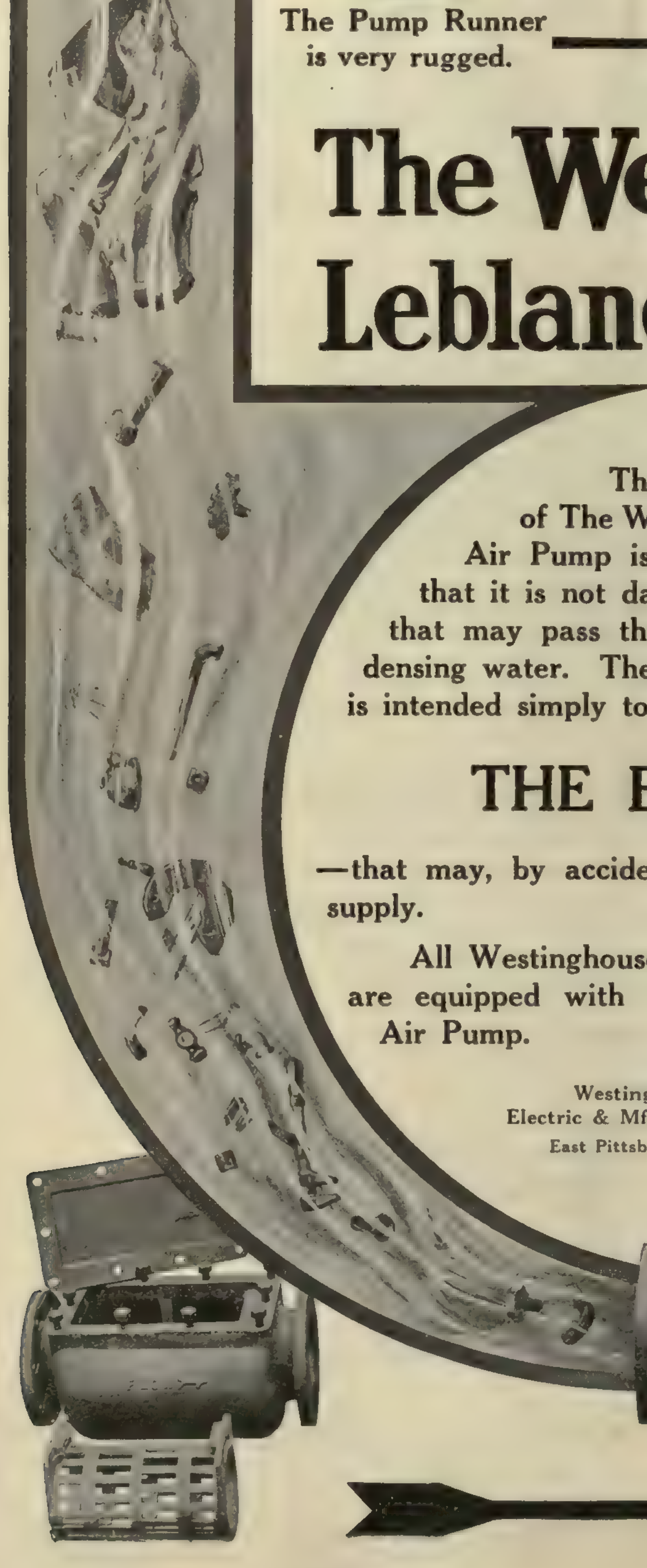
The construction of The Westinghouse Leblanc Air Pump is so simple and rugged that it is not damaged by the small debris that may pass through it with the raw condensing water. Therefore the water strainer used is intended simply to catch and hold—

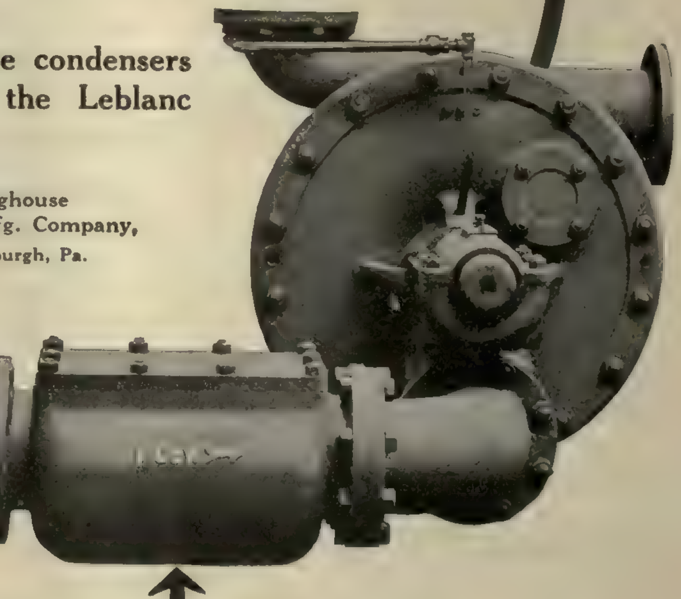
THE BIG THINGS

—that may, by accident find their way into the water supply.

All Westinghouse condensers are equipped with the Leblanc Air Pump.

Westinghouse
Electric & Mfg. Company,
East Pittsburgh, Pa.





Westinghouse

Cycle Counter

For Timing Operation of Relays, Circuit Breakers, etc.

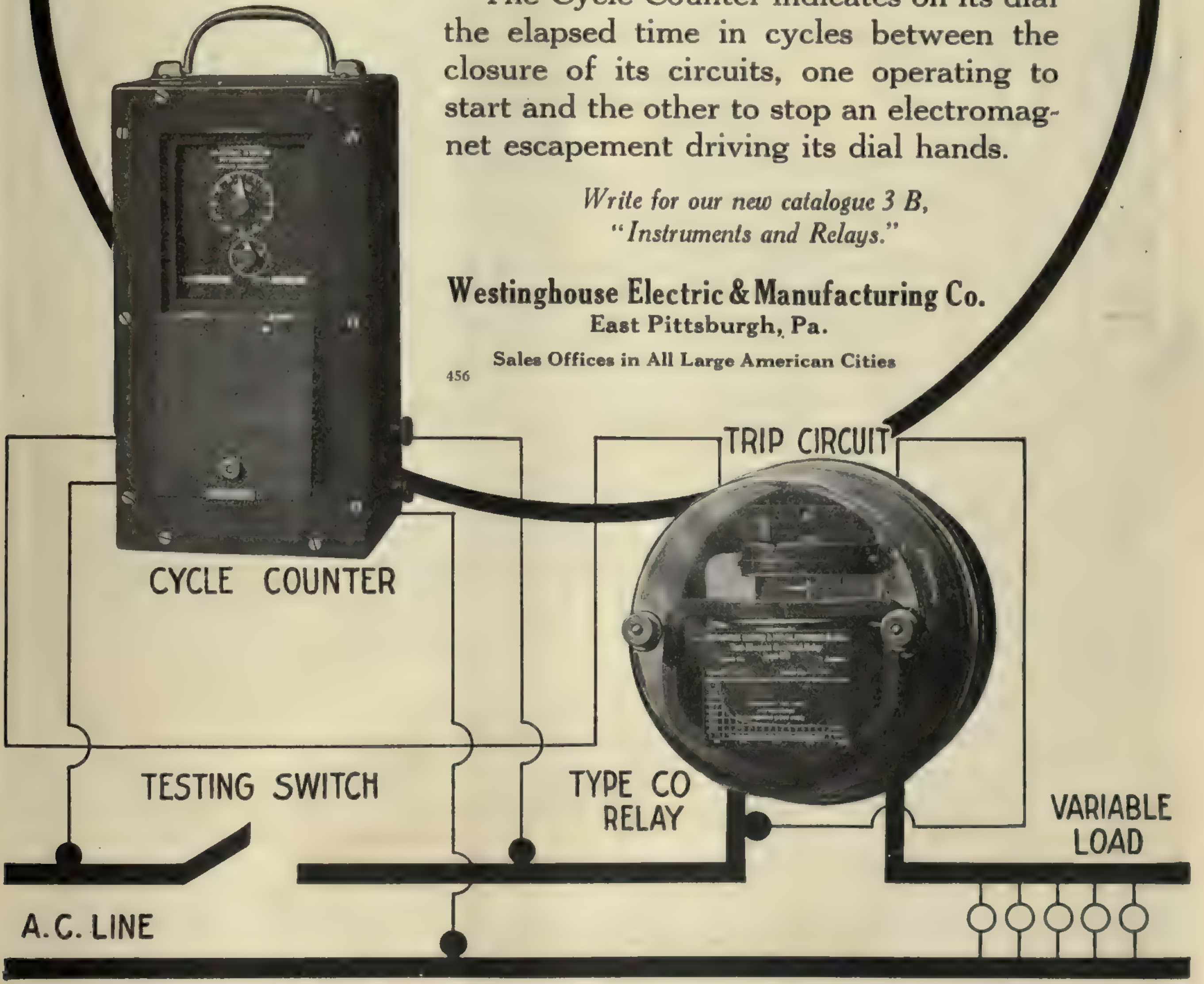
A necessity when a number of relays are to be given different time settings requiring fine time adjustments.

The selective tripping of circuit breakers is made easy when the WESTINGHOUSE CYCLE COUNTER is used to determine the actual time required for the relay to trip and the breaker to open.

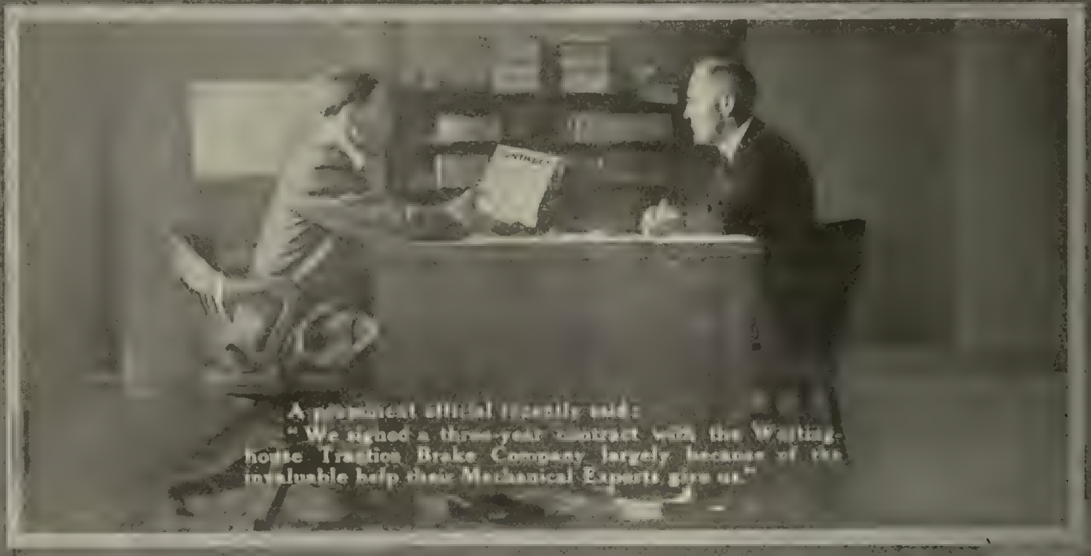
The Cycle Counter indicates on its dial the elapsed time in cycles between the closure of its circuits, one operating to start and the other to stop an electromagnet escapement driving its dial hands.

Write for our new catalogue 3 B,
"Instruments and Relays."

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.
Sales Offices in All Large American Cities
456



The Members of our Field Force are practical men who give their undivided attention to the Brake work of our customers—and their services are free.



A prominent official recently said:
"We signed a three-year contract with the Westinghouse Traction Brake Company largely because of the invaluable help their Mechanical Experts give us."

Westinghouse Traction Brake Company

General Offices: Wilmerding, Pa.

PITTSBURGH:
Westinghouse Building
CHICAGO:
Railway Exchange Building

TRADE MARK

NEW YORK:
City Investing Building
ST. LOUIS:
Boatmen's Bank Building

Duplex Tri-Colored Signal Lamp

Automatic Double Lens Lantern

An Unbiased Recommendation

A prospective purchaser of an O-B Electric Car Signal System wrote to the Superintendent of a Railway which uses this system, asking for the latter's opinion.

The Superintendent, in his reply, described the operation of the O-B System—how it operates ordinarily on the trolley circuit—how current is automatically supplied from a battery should the trolley fail—how it works even though a lamp in the circuit burns out or is broken—and he said in addition:

"We have twelve equipments of the O-B Electric Classification and Marker Signal System installed. The same have been in operation about two years and have given every satisfaction.

"The motormen and conductors on this line speak very highly of them and they are far in advance of oil. The maintenance of the battery so far has been very slight."

Surely this Superintendent, who has used the Signals for two years, should know whereof he speaks.

The O-B Electric Car Signal System is not only safer and more reliable than oil but it is also more economical.

Described in detail on Pages 550-557 of Catalog No. 16.

The Ohio Brass Company

Mansfield, Ohio

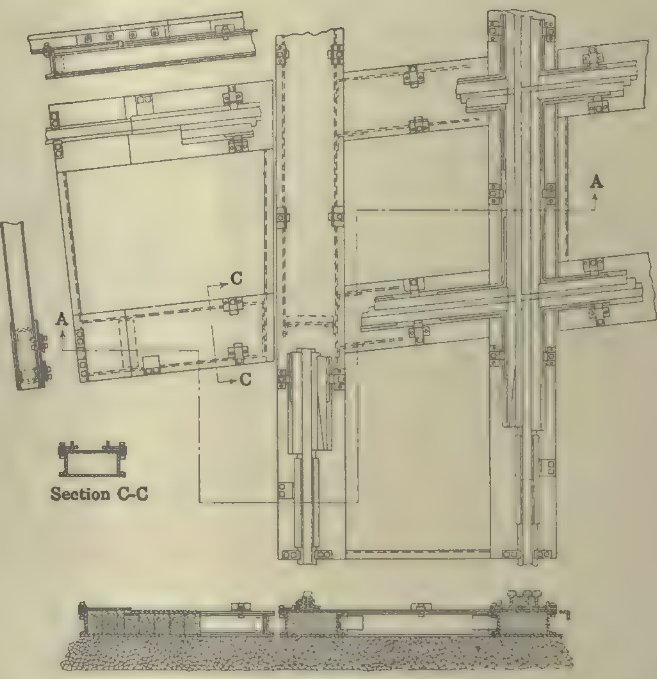
International Steel Railroad Crossing Sub-Structures Are Growing in Favor

—and they have been adopted as standard on a large number of interurban and steam railroads.

These structural-steel box-girder supports were formerly filled with concrete, but creosoted wood block has been found to afford even better riding qualities.

As the illustration shows, these structures are designed to give continuous support to all of the joints in the crossing. The wood block filling is laid with grain transverse to the rail, thus giving support to the top plate of the girder and carrying the wheel loads to the bottom plate and thence to the ballast. This enables the structure to carry the heaviest steam road loads over a span of 6 ft.

The structure shown was recently installed at Wellington, Ohio. The labor cost was interestingly low—ask us about it.



PLAN AND SECTION OF WOOD-BLOCK FILLED CROSSING

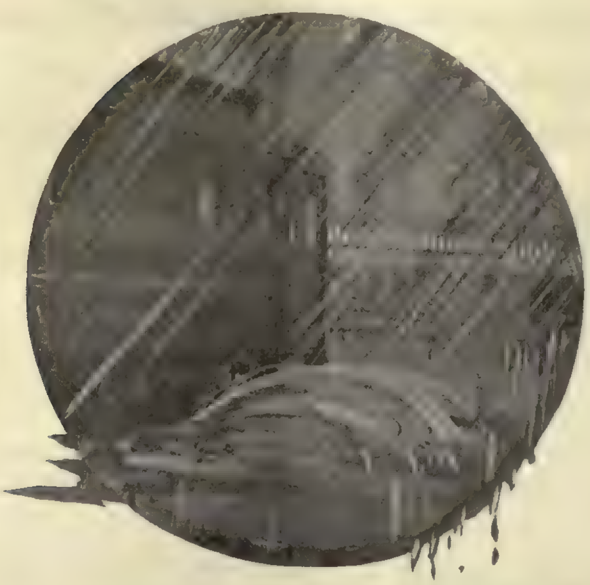
We have a stock of steel on hand and can make prompt shipment of ties

The International Steel Tie Company

General Sales Office and Works: Cleveland, Ohio

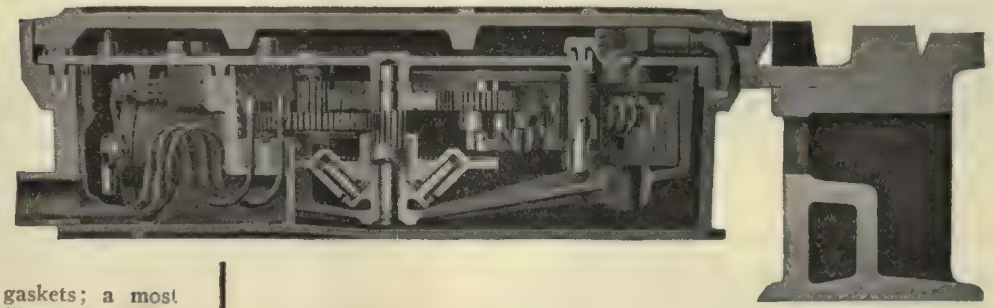
REPRESENTATIVES

Western Eng'g Sales Co., San Francisco, Cal., Los Angeles, Cal.
Seattle, Wash.
R. T. Cooper Co., Salt Lake City, Utah.
J. E. Lewis & Co., Dallas, Texas.
Maurice Joy, Philadelphia.
William H. Ziegler, Minneapolis, Minn.



If you've ever faced a condition like this, you'll know what we mean

when we say that the "Collins" Non-Splitting Electric Track Switch is enclosed in a **watertight** street box. Not watertight by the doubtful help of gaskets or pipe joints—but completely and totally and positively protected against the entrance of water by use of a **mercury seal.**



In the street box itself is cast a trough which is partly filled with mercury—a flange on the inner cover dips into the mercury.

Putting on the cover automatically seals the box—by the **best** method—our **patented** method.

Not **second**-best—but the **best** method of keeping out water that the **brains,** and **factory facilities,** and **capital** of a big, **stable** organization have been able to develop.

The "Collins" Non-Splitting Electric Track Switch

does not splash mud and water; the switch cannot be thrown between the trucks of a car by a following movement under the contactor; the street box is automatically sealed and without dependence on the proper making up of pipe joints or gaskets; a most positive anti-straddling device is provided; only 110 volts is sent into the street box; the entire mechanism can be lifted out of the street box without making any disconnections; the contactors are exceedingly small and simply mounted on standard ears; standing under the contactor for an indefinite period has no damaging effect on any part of the mechanism.

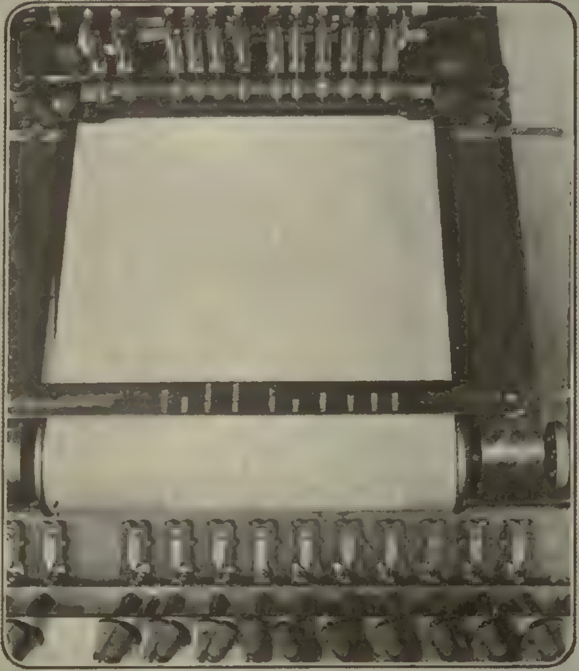
United States Electric Signal Company

West Newton, Massachusetts

Representatives:

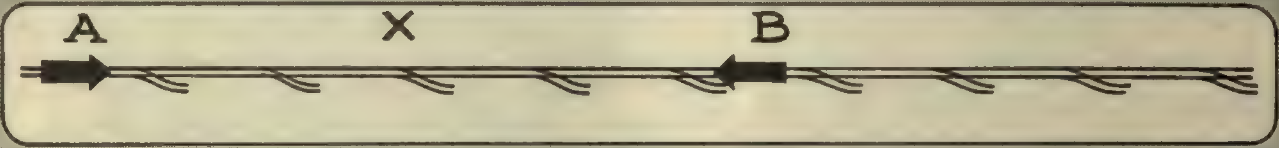
Western: Frank F. Bodler, Monadnock Bldg., San Francisco
Chicago: Warren Moore Osborn, McCormick Bldg.
Foreign: Forest City Electric Service Supply Company, Salford, Eng.

Train Dispatching Simplicity with the Simmen System of Control

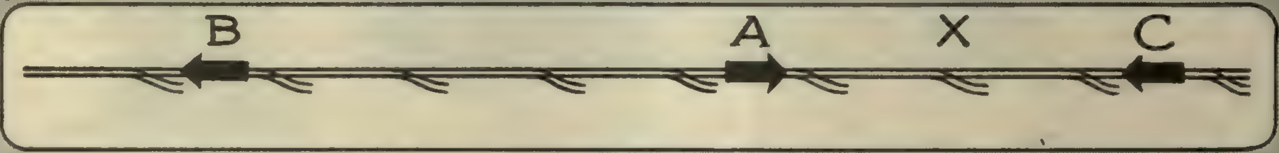


Most railroad men have a general idea that the Simmen System of signaling enables the dispatcher to give the motorman a red or green light in his cab by turning some kind of levers. A good many do not realize how simple this method of controlling train movements really is. The three pictures below show how the interlocking levers are set to move a train through a division with ten sidings and meet two other trains.

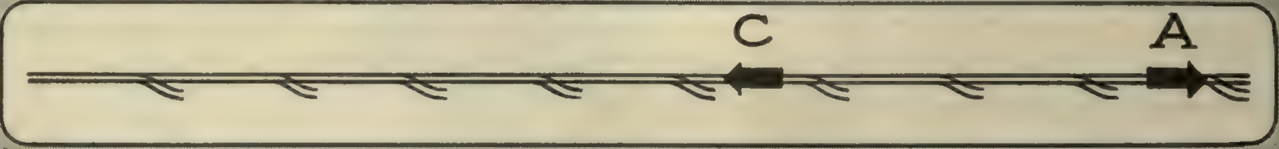
One—The upright lever means that the trains are to meet at this siding. The levers to the left are clear for the eastbound train A. The levers to the right are clear for the westbound train B.



Two—The first "meet" has been made, and now A is scheduled to meet C, as shown by the upright lever. B is proceeding to the west, as shown by the three levers at the left end.



Three—The second "meet" has been made and the levers are set to give A and C clear tracks to the east and west respectively. Note the interlocking which prevents lap orders.



Send for booklet "An Analysis of Railroad Accidents."

SIMMEN AUTOMATIC RAILWAY SIGNAL CO.
1575 Niagara Street, Buffalo, N. Y.
Pacific Coast Representative: W. H. CRAWFORD, 609 Spalding Bldg., Portland, Oregon

Speed Up Your Armature Repairs—Use These Peerless Tools

Peerless Carhouse Appliances and Tools offer the very best means of speeding up your Armature and various other repairs. Each tool or appliance is designed for its special work, and from our catalog you can select from various types of each just the ones to meet your requirements.

Illustrations show typical Peerless shop equipment and demonstrate how strongly and accurately they are made, each tool or appliance having many features embodied only in the Peerless line.

Armature Truck
Type F

Pinion Pulling Machine
Type M

Armature Winding Stand
Type C

Write for Our Special Booklet

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Sts.

NEW YORK
50 Church St.

CHICAGO
Monadnock Bldg.

Put These Bearings on Old Cars to Reduce Flange and Rail Wear

The wisest mechanical men are reducing wheel flange wear under their old cars, decreasing pull-ins for worn flanges, saving labor cost, and giving their way departments a chance to save too, by equipping present rolling stock with

Perry-Hartman

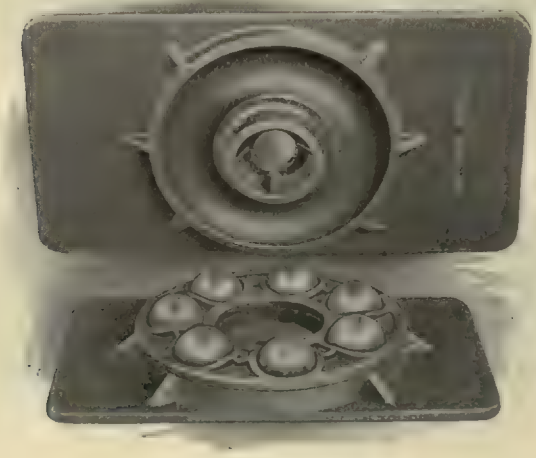
self-centering center plates and anti-friction side bearings.

There is no economy in waiting to get new cars or trucks for this purpose when so many roads are installing Perry-Hartman bearings on old cars and getting results in time and money saved.

These bearings can be readily placed on almost any truck and body bolster. The side bearings stop binding between the bolsters, which is the chief cause of excessive rail and flange wear. The centering center plates prevent truck nosing or lurching from side to side, which wears out rails and flanges and constantly racks the whole car body.

Moreover, the cost of these bearings is little more than friction plates. Their maintenance is nothing, and wheel turnings which they save will soon pay for the new bearings.

Reduce Flange Wear
Decrease Rail Wear
Lessen Derailments
Stop Truck Nosing
Eliminate Lubrication
Save Power on Curves
Prevent Wheel Climbing



Send to nearest office for new catalogue describing these bearings and showing types of application.

Holden & White

Electric Railway Distributors for The Joliet Railway Supply Company

1508 Fisher Building, Chicago

U. S. Metal & Mfg. Co., New York and Washington; Grayson Railway Supply Company, St. Louis; C. F. Saenger & Co., Cleveland; Brown & Hall Supply Co., St. Louis; C. E. A. Carr Co., Toronto; W. M. McClintock, St. Paul; Alfred Connor, Denver; O. H. Davidson Equipment Co., Salt Lake City; F. F. Bodler, San Francisco; S. I. Wailes, Los Angeles; W. F. McKenney, Portland, Ore.

Phono-Electric is Worth Its Price

(*An advertisement based on an interview with the line engineer of a large city company*)

It costs more to make Phono-Electric Trolley Wire than other kinds.

Its *first* selling price is therefore higher, but you can be sure that its *ultimate* selling price is *not* higher.

Have you determined the line of demarcation between Phono-Electric and copper on each of your lines?

Here are some places where Phono-Electric Trolley Wire is always the lowest-priced in the end.

On heavy lines where wire is worn rapidly.

On curves and turnouts where wheel-hammer and side wear are common.

On grades where abnormal currents must be collected.

On narrow streets where replacements are difficult.

As Phono-Electric is good for at least three times the wear of ordinary wire and with astonishingly fewer breaks, it will often pay to put it up even in comparatively light service.

BRIDGEPORT BRASS COMPANY
BRIDGEPORT CONNECTICUT

"The technical or trade journal of today is the livest, most 'up-to-now' assistant that the public utility man has"

—says H. S. COOPER, secretary Southwestern Electrical & Gas Association, on the reading of technical journals.

He further says:

"It is the Always Ready Reference of the minute, and the officer, official, head of department, or even workman, who does not use it is neglecting one of his best friends!

"Now, I am not soliciting subscriptions for any trade or technical publication; I am not interested financially in any of them; my only interest in their use is that I have not only found them of immense value in all the businesses which I have managed, but I have yet to find a real up-to-date, hustling, successful manager or head of department who does not promptly and fully read his technical and trade publications, note and file the matter that interested him or was or would be of use to him in his business. * * * And in no other way can any operative, no matter how high or low his position, keep so fully abreast of the times in his business as by early and careful perusal of his trade and technical periodical from its front to its back cover. And from no other source can he obtain the immediately useful as he can from a well-filled and indexed present volume of those same publications.

Those who have tried this know that the above is the truth. Let those who have not tried it **give it a trial for six months or a year** and they will thank me for calling their attention to this matter!"

Here's the COUPON that will bring it—the Electric Railway Journal— to *you* on trial!

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239 West 39th Street, New York

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You may enter my subscription for the Electric Railway Journal for one year.

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Tubular Pole

is the Safest

and

Least Cumbersome

In cities where sidewalk space is valuable there is demand for the pole that occupies the smallest ground area. When this fundamental—the smallest ground area—is compounded by many other points conceded to be meritorious, you have the specifications written for Elreco Tubular Steel Poles.

Children cannot climb them.

Teamsters cannot readily use them for a hitching post.

They offer slight opportunity for hubs of vehicles to engage them in passing.

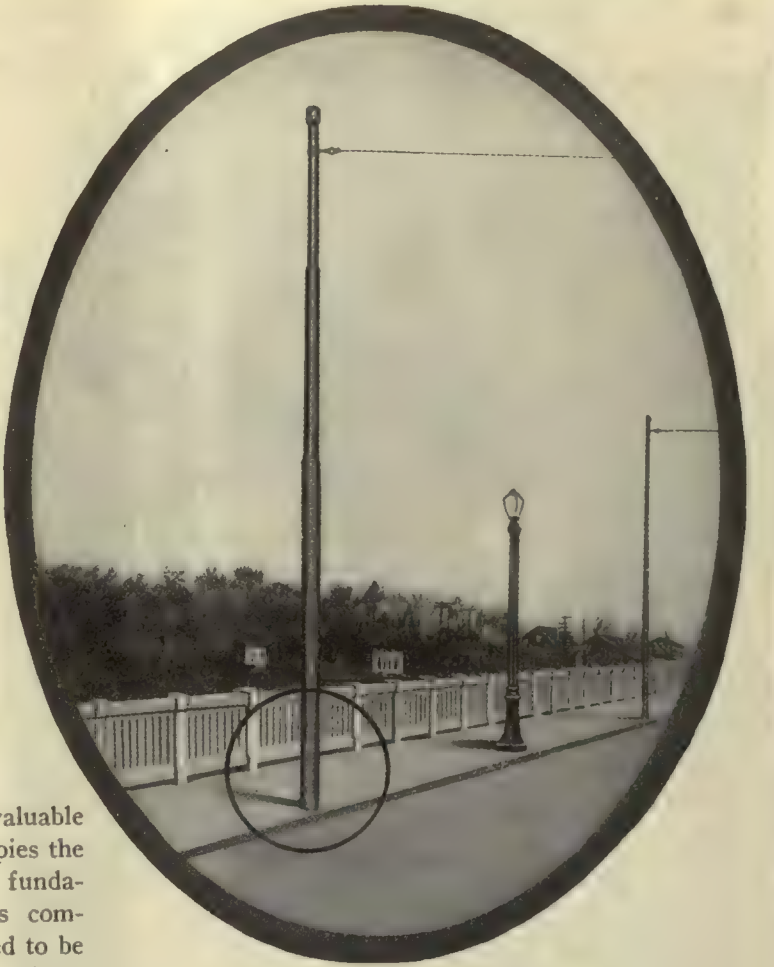
They offer unexcelled ease in painting.

They surpass every other form and shape of pole in uniformity and in their ability to withstand strains in all directions.

An Elreco Tubular Pole occupies but 34½ sq. in. at the ground line. For your own edification, compare these figures with those of poles other than Tubular.

These are but a few of the many reasons why Elreco Poles have been used so extensively by leading street railways throughout the world. In theory as well as in practice, these poles are conceded to be rightly designed. Likewise they are the safest and the most serviceable.

Let us have your inquiries for your present and future requirements.



ELRECO Tubular Poles

Combine

Lowest Cost
Lightest Weight
Least Maintenance
Greatest Adaptability

Electric Railway Equipment Co.

Cincinnati, Ohio
New York: 30 Church St.

THE CHAMPION BONDING OUTFIT

at the Side of the Track

The steel cart shown below stands at the side of the car tracks and is especially designed for bonding on city streets where car service is frequent. Bonds can be installed while cars are passing as shown in the cut.

All of the bonds at any piece of special work can be installed without moving the cart.

The cart carries the complete outfit and can be easily moved from one job to another.

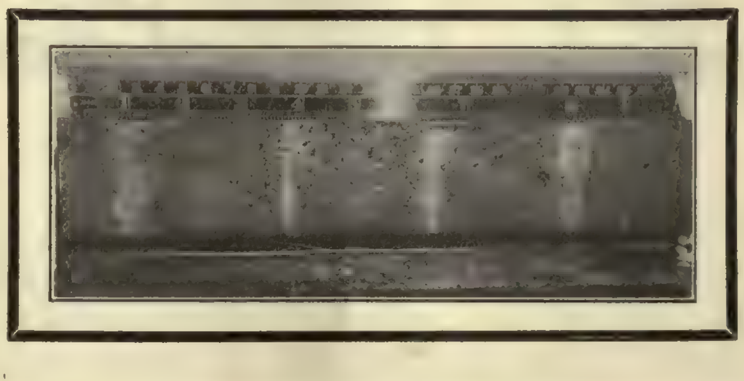
Write for particulars

The Electric Railway Improvement Co.

Cleveland, Ohio

The Essential Thing in Track Grinding Is to Get an EXACT Result

An Unretouched Photograph



That Tells a Touching Story

It shows the corrugated surface of a rail after thirteen months' use. The touching part of the story is that the corrugations had been "ground out of it" twice during that time.

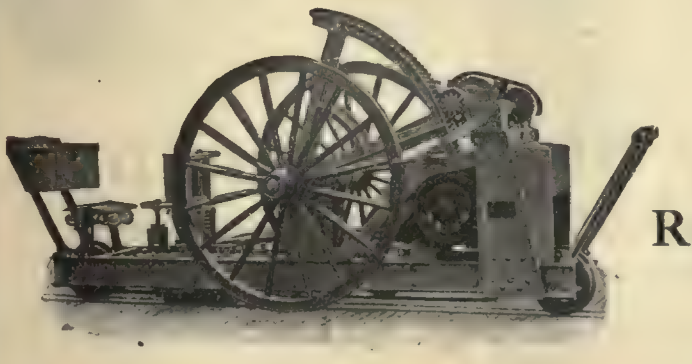
It is possible the corrugations were "ground in it" rather than "out of it." That's very likely to occur where a grinder does not give an *exact* result.

You can realize how exact the result must be to be a result and not a cause when you consider you are dealing with crests and depressions of the hundredth part of an inch.

The Reciprocating Track Grinder

by the 400 strokes per minute of its 40 square inches of surface contact moving horizontally back and forth across the rail can and does produce exact results. It produces these exact results quickly, economically, and independently of the skill of the operator.

Other methods may produce exact results, but they cannot be depended on to give them always. When they do give exact results, the highly skilled labor, very fine adjustments and great waste of time involved make the cost disproportionate to the value of the work.



Exact results at the lowest cost is what we claim for the Reciprocating Grinder. We'll stake you to one till we prove it to your satisfaction.

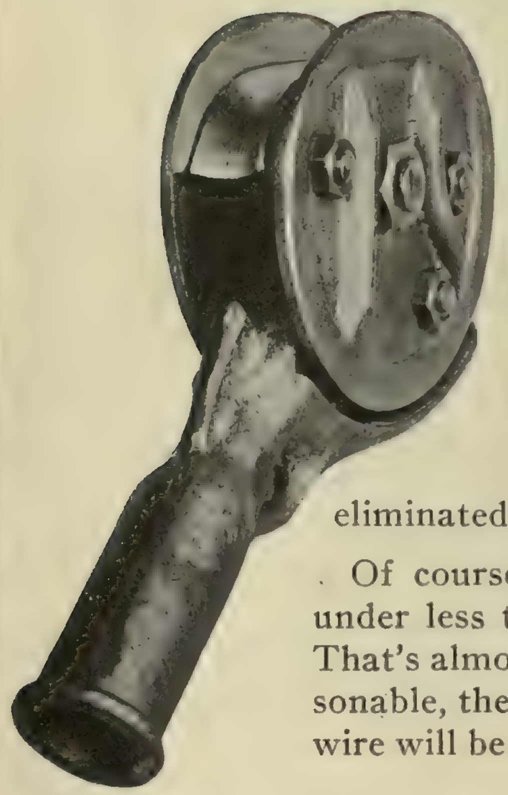
Railway Track-work Co.
30th and Walnut Streets
Philadelphia

The Miller Trolley Shoe Eliminated These Three:

~~Noise, Vibration, Sparking~~

The Chicago & Milwaukee Electric Railroad installed its first Miller trolley shoes in its hardest service, to wit—

On 40-ton cars equipped with four 140-hp. motors each and operated at 60 m.p.h.



And the only trouble experienced was in shunting the heavy current—a trouble easily corrected.

From the first it was observed that the Miller trolley shoe practically eliminated noise, vibration and arcing.

Even at splices, the arcing is practically eliminated.

Of course, the Miller Shoe is operating under less tension than the trolley wheels. That's almost always the case. Sounds reasonable, then, to assert that the wear on the wire will be less, doesn't it?

Miller Trolley Shoe Company

53 State Street **Boston, Mass.**

Sales Representatives:

Holden & White—Chicago
W. F. McKenney—Portland, Oregon
F. F. Bodler—San Francisco, Cal.
S. I. Wailes—Los Angeles, Cal.
Alfred Connor—Denver, Colo.
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SLAM! BANG! CRASH!!

Ever watch conductors rush through a car at the end of a run to reverse the cross-seats?

Isn't it a fact that many of them look upon this job as something to be done with all the brute force at their command?

That kind of mauling thirty to thirty-five times a day, ten thousand times or more a year can be withstood successfully only by

Hale and Kilburn "Walkover" Reversing Mechanism

This is not an empty claim. It is a fact that we have proved on a number of seats, by reversing them through an electrically operated arm. This arm actually reversed the back with much more force than would be exerted by the ordinary conductor.

234,000 COMPLETE REVERSALS

backward and forward, of the Hale & Kilburn No. 400 seat were obtained in one test, without injury to the seat; while 202,600 complete reversals were obtained with the Hale & Kilburn No. 300 seat before the first indication of wear.

If you want to avoid jammed seat-backs, you want Hale & Kilburn mechanism—the only seat mechanism which has been found capable of withstanding more than 200.000 reversals without trouble—a record well ahead of the useful life of a car seat.

**Hale and Kilburn "Walkover" Seat Mechanism
Calls for Least Maintenance.**

Hale & Kilburn Co.

Philadelphia New York Chicago
Washington San Francisco

We Will Help You
AGREEMENT
BETWEEN THE
GALENA SIGNAL OIL COMPANY of Franklin, Pa.

When you make a Galena Contract, you unload your lubricating troubles on us, and we immediately supply you with **the best** oils for each service and take steps to eliminate all lubrication and allied troubles. Naturally, this results in a lower cost, and in any event our guarantee protects you.

Galena-Signal Oil Co.

Franklin, Pa.

The Psychology of

ECONOMY

SANGAMO
BUILT LIKE A WATCH

METERS

The Pace Setter

Setting a pace and sticking to it is what makes for ever-higher records.

That is why in so many fields of human endeavor they have a pace setter. A guide to regulate the expenditure of energy to the end that it may be conserved as far as possible. A leader to bring out the best there is in a man.

That is the psychology of the ECONOMY meter and the *Economy Campaign.* They tell the motorman where he is wasting energy, where he is saving it, and how much. They spur him on to increased operating efficiency and point the way to conservation of car equipment.

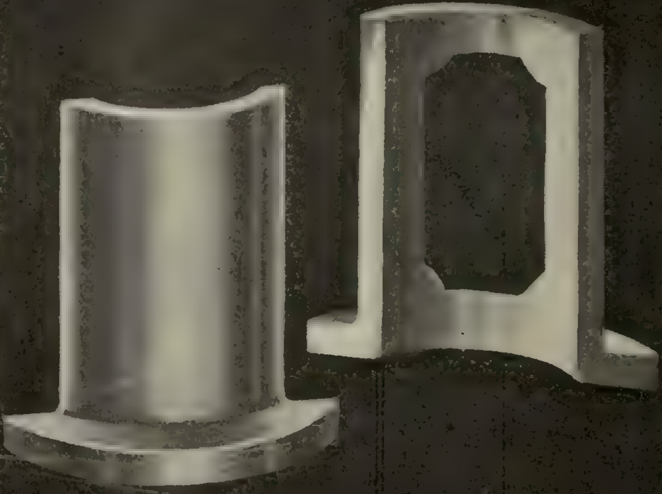
Get the details of Economy Meters and Economy Campaigns and see for yourself the physical effects of this psychology which are already matters of record.

Sangamo Electric Company

Springfield, Illinois

Specialists in Meters for Every Electrical Need

MORE-JONES 'TIGER' BRONZE AXLE *and* ARMATURE BEARINGS



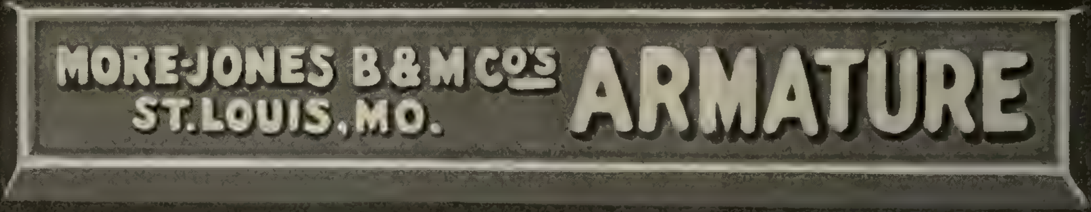
An assurance of uninterrupted axle and armature bearing performance is best secured by using MORE-JONES "TIGER" BRONZE BEARINGS. Their material is the purest, densest and most durable and has proved beyond dispute its ability to withstand the most severe influences. The real test is actual service.

MORE-JONES ARMATURE BABBITT METAL is strong, tough, pliable, long wearing and of the lightest obtainable bulk. An exact product designed for an exact purpose. Notable for the length of time it keeps armature bearings in service.

Further information and prices on application

MORE-JONES BRASS & METAL CO., ST. LOUIS, U. S. A.

MORE-JONES ARMATURE BABBITT METAL



National Pneumatic Manual Door Devices are Promoting Safety and Protecting Schedules on the Liberty Bell Route

The Lehigh Valley Transit Co. made many severe tests before ordering this equipment for the twelve new Southern all-steel center-entrance interurbans which they have recently put in service.

The National Manual Equipment used on these cars is helping to solve traffic-handling problems in large and small cities, and in city, suburban and interurban work.

The selection of this equipment for such high-class service as that of the Lehigh Valley Transit Co. calls for no comment from us.

NATIONAL PNEUMATIC COMPANY

50 Church St. New York

515 Laflin St. Chicago

"The kid ran out from behind an ice-wagon"

panted Conductor Williams as he rushed into the office of the Superintendent of Transportation. " 'Twas down at Marble Avenue and Stone Street—and he was chopped up under the front truck 'fore I even knew he was there.

"The old fender had crumpled up on a cobblestone ten blocks back, and we left it on the curb—so when the kid rolled under the car there was nothing to save him, though Bill almost pulled the brake out by the roots.

"You know the gang down there on Marble Avenue—they began to growl, and pretty soon the air was full of bricks. The first cop on the job put in a call for the reserves, and we were lucky to get the car out whole, barring a few smashed windows.

"Bill was arrested for homicide. The cop rode up here with him—taking him to the lock-up now."

The Superintendent turned to the Claim Agent with a worried look. "This makes the second one this week, on the Marble Avenue line alone. We've got to do something to stop these accidents."

"You *bet* we have," rejoined the Claim Agent—"and we got to do it *quick!* I believe H-B Life Guards or Providence Fenders would prevent most of our bad accidents—and I'm going to recommend them to the General Manager."

The Consolidated Car Fender Co.

Providence, R. I.

General Sales Agents

Wendell & MacDuffie Co.

61 Broadway, N. Y.

First of a series of talks on Fewer Accidents and Better Public Relations.

WHY HESS-BRIGHT BALL BEARINGS PAY

The experiments of the New York State Railways-Rochester Lines with Car 721 equipped with Hess-Bright journal ball bearings (car weighing 48,600 lb. empty and 59,850 lb. loaded) showed

An energy saving of 14.1 per cent or 0.47 Kw-hr. per car mile.

Equivalent to 15,510 Kw-hr. for an annual service of 33,000 car miles.

At 1 cent per Kw-hr., the yearly power saving alone would be $155.10.

To this may be added minor savings in lubrication and maintenance, making the total saving at least $160 per annum per car. These savings make no allowance for the cost of hot boxes and service delays incident thereto.

Write us for prices and you'll see for yourself why Hess-Bright Ball Bearings pay very large interest on the investment.

TRADE MARK
HB DWF
HESS-BRIGHT
THE INIMITABLE BEARING

THE HESS-BRIGHT MANUFACTURING COMPANY
FRONT ST. & ERIE AVE., PHILADELPHIA, PA.

HESS-BRIGHT CONRAD PATENTS ARE THOROUGHLY ADJUDICATED

Richey's

Electric Railway Handbook

and the

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IN accordance with our holiday custom of several years, we are offering *free* stamping of your name, or the name of the recipient, in gold, on any McGraw-Hill book ordered of us prior to January 1, 1917.

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By Albert S. Richey, E.E., Consulting Engineer, Professor of Electric Railway Engineering, Worcester Polytechnic Institute. 832 pages, flexible leather, pocket size, over 600 illustrations, $4.00 (17s) net, postpaid.

The standard work to-day for electric railway men. It contains a collection of practical data, formulas and tables classified and indexed for quick reference.

It covers Roadbed and Track, Buildings, Train Movement, Railway Motors, Controlling Apparatus, Current Collecting Devices, Trucks, Braking, Rolling Stock, Transmission and Distribution Signals and Communication.

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Publishers of Books for Electric Railway Journal

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Other Ry. Motor Gear Mf'rs.
have brought out a total of
22 grades of gearing
each one "as good as Tool Steel"
BUT
Cincinnati "Tool Steel" is still
the Standard of Quality

Brush-Holder Castings

One of Many Columbia-Made Specialties

Yes, here are a few of the thousands of brush-holders that we turn out every year for electric railways throughout the land.

Columbia-Made Brush-holders are available for any motor.

This is only one example of the kind of service we have built up to make home manufacture by railways unnecessary as well as uneconomical.

For instance, the brush-holder castings shown in this picture are for some of the biggest electric railways in the United States.

They wouldn't be buying Columbia-made goods unless there was a saving in time and money, would they?

Give Our Service a Trial—not only for Brush-Holders but for Products Like These:

TOOLS

Armature and axle straighteners
Armature buggies and stands
Babbitting molds
Banding and heading machines
Car replacers
Coil taping machines for armature leads
Coil winding machines
Pinion pullers
Pit jacks
Signal or target switches
Tension stands

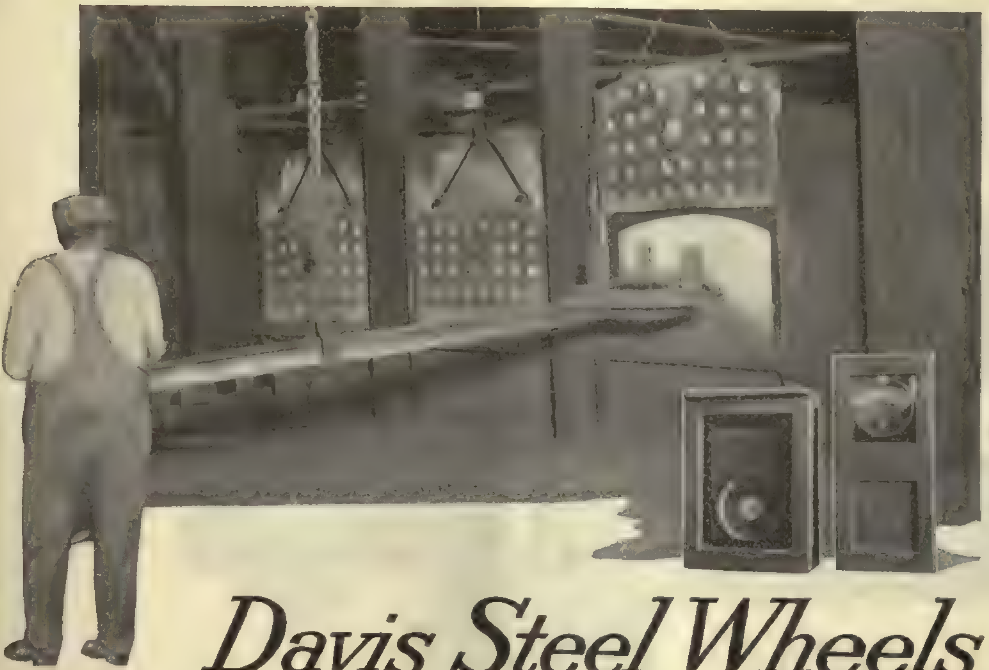
CAR EQUIPMENT

Armature and field coils
Brush-holders and brush-holder springs
Brake, door and other handles
Brake forgings, rigging, etc.
Car trimmings
Commutators
Controller handles
Forgings of all kinds
Gear Cases (steel or mall. iron)
Grid resistors
Third-rail contact shoes and accessories
Trolley poles (steel) and wheels

Columbia Machine Works & Malleable Iron Co.

Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

W. R. Kerschner Co., Inc., N. Y. Holden & White, Chicago F. F. Bodler, San Francisco



Davis Steel Wheels Are Heat Treated

After the wheels are shaken out of the molds, they are placed in annealing ovens, the temperature of which is very carefully regulated by electric pyrometers. Too many lives and too much property are dependent for their safety upon Davis Steel Wheels to take any chances with cooling strains or other imperfections. No detail is left to chance.

But safety is only one advantage of Davis Steel Wheels. Economy is equally important.

The manganese steel "one-wear" tread insures full life service without any grinding, wheel removals, or truck changes and the accompanying high expense in labor and special machinery. If you stop to figure up the cost of wheel removals you will soon realize why the Davis Steel Wheel has been pronounced most economical for electric railway service.

Let us send you all the facts.

Davis Steel Wheels

The steel wheel with the one-wear tread.

No turning—no trouble with motor clearances.

A hard, tough manganese tread and flange.

A soft, ductile steel plate and hub.

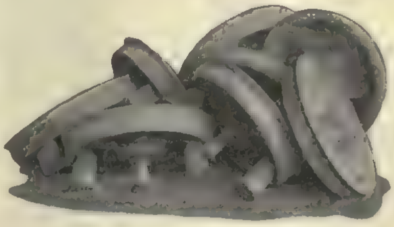
Reduction in slid-flats.

20% saving in weight.

Minimum maintenance cost.

Strength—safety—economy. The steel wheel backed by years of successful service.

You are not expected to adjust your conditions to meet our product. Davis Steel Wheels are made to meet A.E.R.A. specifications, and your service requirements. Write.



Each wheel is cast with two risers,—surplus metal which insures solidity and allows for escape of air.

American Steel Foundries

1100 McCORMICK BUILDING CHICAGO

COLLIER SERVICE

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INVITED
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our
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CENTRAL
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INCORPORATED

Never Too Hot—
Never Too Cold

When the

Peter Smith Thermostat

Controls the Heaters

When you order Peter Smith Gravity Electric Heaters—as most of the big, progressive roads are doing—specify also—as **they** do—Peter Smith Automatic Switches and Thermostats.

In these days of skyrocketing fuel prices and steadily rising labor costs, current for electric heating is too valuable to be wasted.

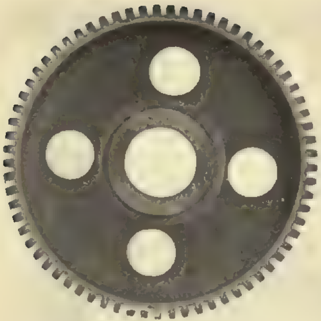
Peter Smith Thermostatic Control takes this important matter out of the conductor's hands—

It assures comfort for the passenger — and worth-while savings for you.

When ordering new cars, or remodeling old, specify Peter Smith Gravity Heaters with Thermostatic Control.

The Peter Smith Heater Co.
Detroit, Mich.
Heater Specialists for Thirty-five Years

PS HEATERS



Reorders Prove Popularity of Grade M Gearing

Grade M Gears and Pinions never fail to give satisfaction. While the list of railways adopting this gearing is steadily growing, the bulk of the business still comes from those roads that appreciate, **from actual use,** the sterling qualities of Grade M.

The recent order for 1500 gears and 4000 pinions placed by the Brooklyn Rapid Transit Company was the direct result of the satisfactory performance of over double this number ordered last December.

Grade M Gearing owes its success not to its excellence in laboratory tests but to its reliability and economy in actual service. It has **earned** its title,

"The More Miles per Dollar Gearing."

General Electric Company

General Office: Schenectady, N. Y.

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For Texas, Oklahoma and Arizona business refer to Southwest General Electric Company (formerly Hobson Electric Co.), Dallas, El Paso, Houston and Oklahoma City. For Canadian business refer to Canadian General Electric Company, Ltd., Toronto, Ont.

6536

Electric Railway Journal

Published by the McGraw Publishing Company Inc.
Consolidation of Street Railway Journal and Electric Railway Review

Vol. XLVIII NEW YORK, SATURDAY, NOVEMBER 18, 1916 No. 21

INTELLIGIBLE ANNUAL REPORTS

Completeness and simplicity are two highly-important attributes of an annual report of a corporation—these covering, on the one hand, a full publication of all relevant data and, on the other, a straightforward and plain presentation of the salient facts and conclusions to be drawn from the data. Different reports possess these attributes in varying degrees. For example, steam railroad reports with their maze of figures and long explanations are generally complete but too complex for the average stockholder, while many electric railway reports are so simple as to offer enlightenment to all along general lines, but so restricted in data as to make detailed analyses difficult, if not impossible. Each industry can well emulate the other to a greater extent. The Rock Island Railroad, in a desire for greater simplicity, has included in its latest annual report a "summary for ready reference" of the main points in the report, and other steam railroads should adopt the practice. Such a device is not new to electric railways—one company, the United Railways & Electric Company, Baltimore, Md., even has a certified public accountant insert a special analysis of the features of the financial statements. Most electric railways, however, ought to make their reports more nearly complete, and the fundamental outline of the ordinary steam railroad report would serve as a good basis for a careful investigation into this subject. It seems to us that there is an excellent opportunity for the Accountants' Association to do some more constructive work through formulating a model annual report.

COMMITTEE WORK OF THE ASSOCIATION

On another page of this week's issue is printed a list of committee subject assignments for the Engineering and Transportation & Traffic Associations, including those with which these associations and others are jointly concerned. This list is ready a month earlier than last year, and the committees have, therefore, a flying start for the year's work. As an association we were not altogether proud of our committee work, as a whole, during the past year, although some reports were conspicuously good. The dissatisfaction with some of the work was publicly expressed at the convention, particularly at the meetings of the Transportation & Traffic Association. The situation was partly the result of the conditions outlined more than two years ago in an editorial in the Electric Railway Journal under the heading "Can Committee Work Be Overdone?" The point made therein was that if a committee has accomplished its purpose it should be honorably discharged, or if it has failed to appreciate the opportunity before it, it should be revamped. Probably all will agree that there were too many so-called progress reports presented at the Atlantic City convention. The general plan of committee work of the association is excellent, and much that is of very great value is being accomplished. The result is, however, not what it might be in view of the expenditure of funds and time involved. The amount of money invested by the association each year in financing committee meetings and the much greater money value of the time of high-salaried men spent in committee work should result in reports which will represent substantial progress in our knowledge of the art. The progress of our industry and the standing of the industry and the association in the country depend to a large extent upon the results of committee work. Outside critics judge the association by it, and perfunctory reports reflect upon all concerned.

GETTING THE WORK STARTED WELL AND EARLY

The importance of early planning and starting of committee work is evident when we consider that under present conditions but about one-half of the year is available for planning, for accumulating data and for analysis and deductions. Reports should be completed about four months before the convention, and the acceleration period requires about two months at the beginning of the year. The present plan of operation insures a certain amount of continuity, but each year the committee machinery must be lubricated, brought up to speed and supplied with continuous power. The Transportation & Traffic Association took a commendable step in changing its method of organization this year to insure early beginning of the year's activities, and the Engineering Association also made a good start by appointing its committee chairmen at the convention. The digest of work of previous committees which formed a part of many reports last year should help this year's committees in getting down to business. Above all, however, it is essential that committee members and their employers take this work seriously. Committee appointments are not simply an honor. They mean hard work, and if one is not willing and able to shoulder his part of the task he should not accept the appointment. Most important of all, when a company permits an employee to accept a committee appointment it should be with the determination to see to it that he has time and opportunity to do his share of real work. Never has there been a year when the importance of this was so clearly realized by the members of the association.

PROTECTIVE DEVICES AT DRAWBRIDGES

The recent accident in Boston when a loaded street car went off a drawbridge into deep water, drowning most of the passengers, should convey a lesson as to safety precautions necessary in so dangerous a place as an open draw. Just how and why the accident occurred has not yet been fully disclosed. But a fact which stands out conspicuously is the altogether insufficient protection afforded by the usual safety precautions at drawbridges of the swinging sort. Two light gates carrying small red lamps are hardly worth considering as efficient guardians of the public safety at a bridge over which hurrying crowds are swarming through the rush hours, utilizing every possible sort of transportation. Safety devices reasonably adequate in the day of the horse car and the wagon cease to be so when the automobile and long electric cars are the chief vehicles concerned. Neither chauffeur nor motorman may be disposed to take chances, but under modern traffic conditions either may see the danger signals too late to prevent a catastrophe.

Year by year the practicable braking distance of street cars has increased, owing to the normally higher speed and heavier cars demanded by the conditions of traffic, and it is difficult to see why safety devices have not met the new conditions. A crowded thoroughfare, with automobile headlights and tail-lights streaming in every direction, and electric arcs flaring overhead, the traffic teams cutting off the view, and the perpetual distraction of the crowd of foot passengers, is not an easy place in which to catch quickly anything except the most conspicuous signals. And when it comes to the matter of drawbridges there is a real necessity for something more efficient than the light guards usually provided, really less effective than would be the presence of a well-trained traffic officer.

Naturally, the first suggestion which comes to mind in this connection is that final dependence should be placed upon automatic mechanical and electrical devices rather than upon human beings, so liable to "man failure." Derailing switches interlocked with the draw, automatic bumpers, automatic stops, etc., would seem to provide the necessary insurance against running into an open draw. It is quite probable that this accident will serve as a forceful further stimulant to invention along these lines.

Automatic devices would no doubt have been adopted more generally long ago on electric roads but for the fact that they in themselves introduce new elements of danger. A derail, for example, set at the wrong time, might do more harm than it could ever prevent; a section of trolley wire might be dead when power was most needed; the presence of an automatic stop might tend to remove a sense of responsibility from the motorman, etc. But we cannot get away from the fact that accidents like that of last week should not happen. An advantage of the increasingly popular bascule bridge, especially the double-leaf variety, is that it places an impassable barrier across the roadway. The Boston accident will undoubtedly impress this fact upon the minds of those responsible for safety at river crossings. It will also exert an influence in forcing the development of other safety devices. Theoretically, the problem is simple, as the mechanical opening of the draw furnishes the opportunity to operate any kind of a safety device.

THE WAGES QUESTION

One of the most important problems which electric railway companies are facing in common with other employers of labor on a large scale is the wage schedule. During the past two years we have witnessed a constantly rising rate, and while this has had many ramifying effects, it has been especially hard on those employers, like railroads, which cannot materially increase the rate at which they sell their product to the public.

The problem has both an economic and a political aspect. The former is represented by the rising and risen cost of living as well as by the tremendous present demand of labor from industrial plants engaged in munitions and other manufacture, brought about at least in part by the war. This condition furnishes a legitimate reason for higher compensation for labor, although we believe that workmen should take into consideration not only the present wages but the chances of the permanency of employment after the present artificial activity is over. Coupled with this economic reason for higher wages, however, is also the recent performances of labor in a political way, illustrated especially by the Adamson law.

Each of these situations calls for the most serious consideration on the part of both the political economist and employer. Hence we are glad to note that the steam railroads have decided to test in court the constitutionality of the Adamson law, that the Academy of Political Science is planning to give all of the time during its meeting in New York next week to a study of the present labor situation, and that the National Civic Federation is planning to take up immediately through a committee meeting at Washington the first week in December the question of how best to improve the state and federal mediation and other labor laws. We hope also that the National Industrial Conference Board, which was organized this week in New York primarily as a clearing house on industrial problems for its members and for the public, will be able to do something toward a study of this subject which is of so much importance to the national prosperity.

The crux of the question lies in the fact that so long as wages are based purely upon the day or the hour spent in work there is constant pressure by the employee toward raising the rate and an equally strong desire on the part of the employer to lower it, regardless of the effect upon the other. This condition introduces the fundamentally wrong concept that their interests are diametrically opposed. Actually what the employer wants to buy is not a day's work or an hour's work but efficient production, and the more of this he receives in a day or an hour the more he can pay. Hence there is really a unity of interest between employer and employee. It is because they have not recognized this fact that the labor unions have made their principal mistake.

What Are You Doing For the Public—and Do They Know It?

The Railway Allows the Workman with His Family to Live in the Country

THE public mind lays a lot of stress at times upon what electric railways do TO the people.

But do people know and think about what electric railways have done FOR them?

One has only to look over the daily reports of murder, scandal and of men and things gone wrong to realize that there is not much truly GOOD news.

That is to say, the purveyors of news do not regard it as their vocation to go around digging out and reporting things that are going aright.

Nevertheless there is a market and an audience for news and knowledge of such things.

For example, how much has the electric railway of a given community increased property values in districts from which perhaps it is not yet deriving an adequate return on its investment?

How has the electric railway contributed to the health and general welfare by making it possible for people to live away from congested districts?

What is the biggest 5 cents' worth of anything that a man can buy? Unquestionably it is electric transportation.

Have accidents been cut down? How much and how?

How much more service is now being given for less revenue per passenger than was given ten years ago?

How much better are cars, roadway and service, and how much more do they cost now, than when the 5-cent fare was established?

What does the electric railway contribute in wages, taxes and otherwise to the community?

The answer to every one of these questions is an interesting story.

But no one is going out of his way to dig out the material for these stories; the railway must do it.

It is its business to do it because a knowledge of the answers to these and related questions are essential to the establishment of a fair attitude toward the railways.

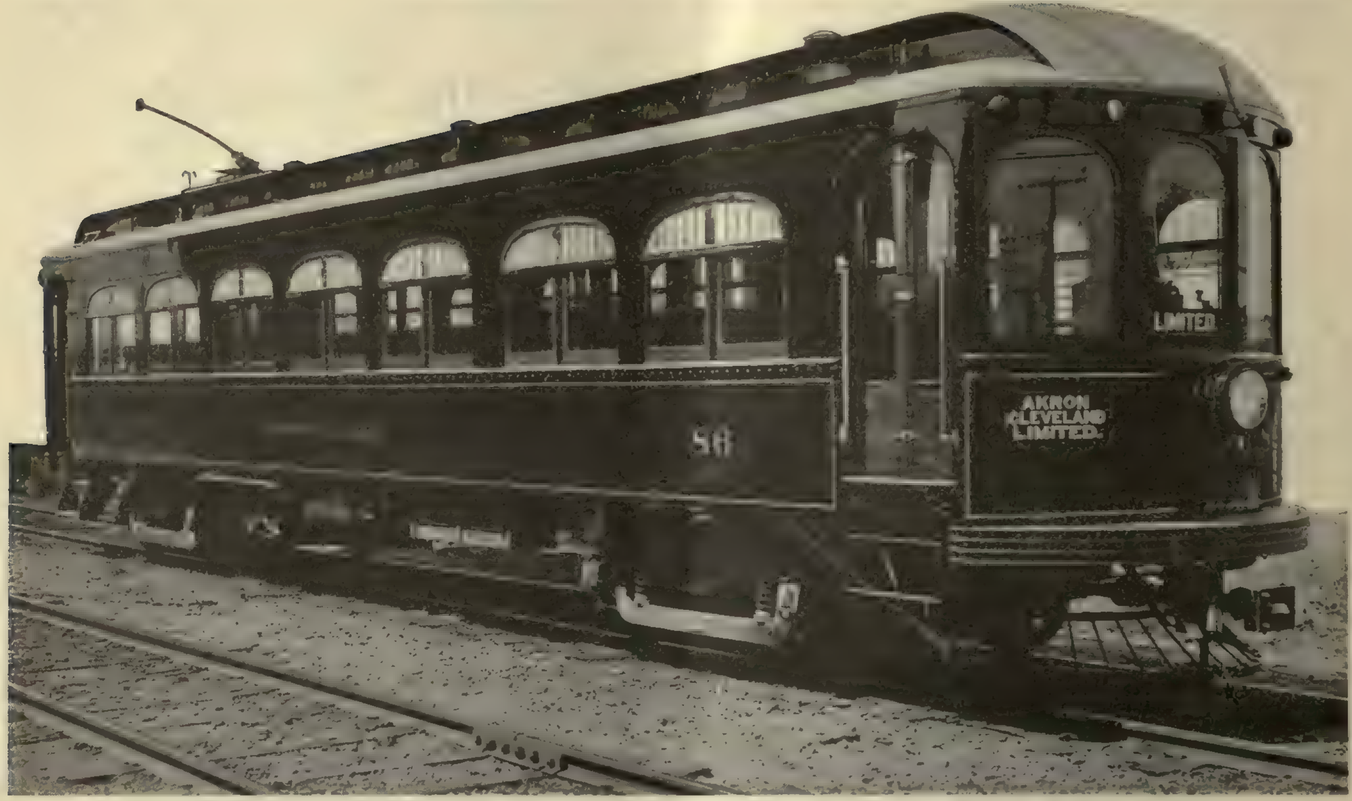
Think it over. Don't you want the public to know what you have done, are doing and will do FOR your town if you are given a chance?

The telling of these things—with others—is publicity work.

It takes a publicity man—with no other duties on his hands—to do this work the way it should be done.

The main thing, however, is for electric railway managements to decide that from now on there is going to be available at least as much information as there is misinformation about them.

What's the use of living, if the bad we do is bulletined daily, while the good is saved to be buried with our bones?



NORTHERN OHIO TRACTION'S STEEL CAR—EXTERIOR VIEW OF COMPLETELY EQUIPPED MOTOR CAR

Car Weight Reduced by Steel Construction

A Description of the New Steel Interurban Passenger Cars Recently Received by the Northern Ohio Traction & Light Company, Akron, Ohio—These Cars Combine Reasonable Weight with Substantial Construction and Weigh 12,000 Lb. Less Than Steel-Underframe Cars of the Same Type

ALTHOUGH the steel interurban cars recently purchased by the Northern Ohio Traction & Light Company, Akron, Ohio, are not radical in any particular, they represent the product of a very careful study of the service requirements. They are 12,000 lb. lighter than this company's steel-underframe cars of exactly the same type, and they have 120 hp. more motor capacity. The new cars were designed primarily for operation in the three-car trains between Akron and Cleveland, Ohio, and the order included thirteen motor cars and two trail cars. This company had forty steel underframe interurban passenger cars in operation which, in so far as dimensions and arrangement were concerned, were satisfactory from an operating standpoint. In preparing the design of the new cars, therefore, it was deemed advisable to adhere to this standard type, but to change the construction from the steel underframe to the steel side-girder type. In making this change, however, the general features of the old cars was preserved so that the new cars could be operated in trains with the old equipment without marring their appearance. It was also considered that better construction could be had if the Gothic transom sashes of the old cars were omitted.

The total weight of the new steel motor passenger car, completely equipped, is 70,000 lb. Of this, 35,000 lb. is in the body and its equipment, including air brakes, heaters and other fittings. The motor equipment weighs 15,000 lb. and the trucks weigh 10,000 lb. each. The old steel-underframe cars weigh 82,000 lb., and they are equipped with GE 204, 75-hp. motors. The new cars are equipped with GE 240-B, 105-hp. motors, and both cars have type MK control. Steel girder construction was adopted for these new cars because it was believed that they would give a longer life in service at a lower maintenance cost, and in case of an accident they were much safer than a wooden or a semi-steel car body.

The general dimensions of these steel interurban motor and trail cars are as follows:

Length over body corner posts	42 ft.	1¾ in.
Length over front platform	4 ft.	9 in.
Length over rear platform	4 ft.	9 in.
Length over vestibule sheathing	51 ft.	7¾ in.
Length over crown pieces	52 ft.	10¾ in.
Width over sills, including sheathing	8 ft.	6 in.
Width over posts at belt rail	8 ft.	6 in.
Width at widest part of car body	8 ft.	8 in.
Center to center of window posts	2 ft.	10¼ in.
Height, top rail to underside of side sills		41½ in.
Length of smoking compartment	11 ft.	9 7/16 in.
Length of main passenger compartment	29 ft.	3 15/16 in.

STEEL FRAMING DETAILS

Commercial sections and pressings were used in the framing of these cars. There are two 8-in. 18-lb.

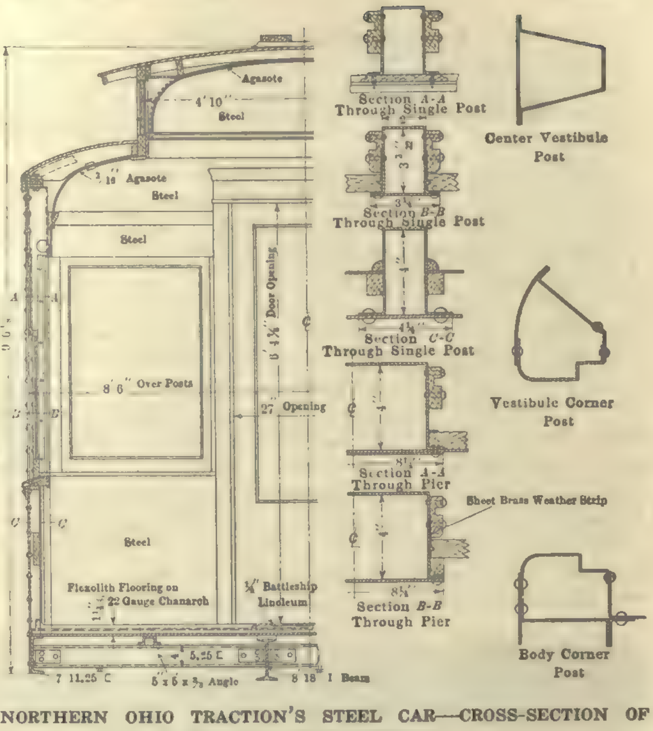
I-beam center sills at 16-in. centers extending from the front buffer to the rear body corner post; 7-in. 12¼-lb. side sills, and a ⅛-in. x 34-in. side plate reinforced at the belt rail with a ⅜-in. x 2½-in. bar. All cross-sills, excepting those at the rear body bolster, are 4-in. 5¼-lb. channels riveted to the webs of the center and side sills. The cross-members at the rear bolsters of the car body are formed of 6-in. 10½-lb. channels. The end sills are 7-in. 12¼-lb. channels, and the needle beams are formed of 6-in. 12¼-lb. I-beams.

A drop platform 7⅛ in. below the main car floor level is provided at the rear end of the car body. The center and outside supports of this consist of 6-in. 10½-lb. channels arranged to clear the motors and trucks, and they extend to the rear body bolster. The front buffer is depressed below the body framing, and it is built of two 4-in. 8½-lb. I-beams riveted to the bottom framing between the side and center sills. The top of this buffer framing is 8 in. below the main car floor level, and it is reinforced by ⅛-in. top plates riveted to the four buffer framing members. The buffer end is formed of a 7-in. 9.8-lb. anti-climber riveted to a 7-in. 12¼-lb. channel. The rear buffer is constructed in a similar manner, except that the longitudinal members are the extensions of those supporting the platform. A pressed U-section longitudinal support is also provided between the center and side sills. The body bolsters are of the built-up type, the top and bottom plates being 1 in. x 10 in. in size, and separated by gray iron castings. The bottom member of the bolster is arranged so that it can be removed without disturbing any part of the underframing.

OTHER STEEL DETAILS

All body posts, including side, corner, vestibule and door posts are made of pressed No. 14 gage sheet steel. These were substituted for commercial shapes because they were considered a more economical section, both as regards weight and strength. The bases of these posts are securely riveted to the underframing and the tops are riveted to the side plates, to the vestibule plates and to the end plates. The belt rail proper is formed of a 3/32-in. pressed brass section extending the full length of the car body. The several post sections and the belt-rail section are shown in one of the accompanying illustrations. The brass belt rail or sash rail is brazed to each post along all lines of contact. The letterboard is formed of ¼-in. steel and is continuous for the full length of the car body. It is riveted to the side and corner posts as well as to the body side plate, which is formed by a ¼-in. x 2-in. x 3-in. angle. The letterboard is further reinforced between the side posts by ⅛-in. x ⅞-in. x 1 in. angles, which also serve as a fastening for the Gothic sashes.

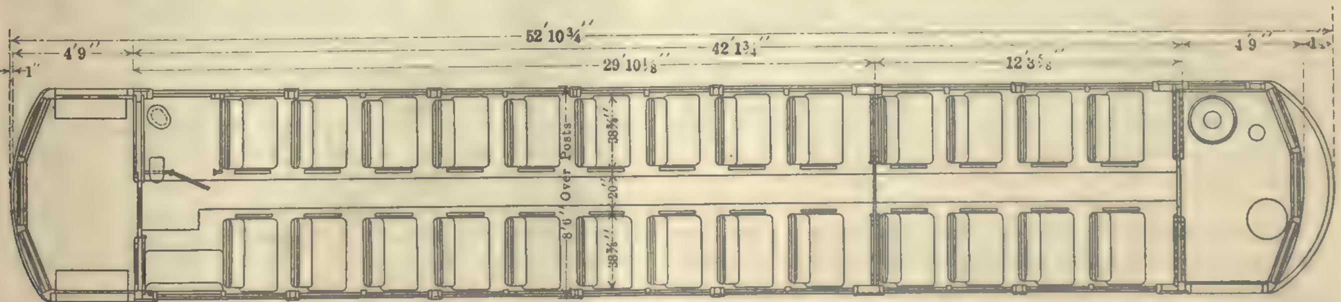
The sash rest in the vestibules is of pressed steel and the dash is formed of No. 14 gage steel. It is also of interest to note that the pressed steel posts which are exposed on the interior of the car body are grained like mahogany to harmonize with the rest of the interior finish. This is also true of the wainscoting, which is formed of No. 16 sheet steel. As a weatherproofing and vibration deadener, all the outside sheathing of the car is covered with ¼-in. cemented felt. The framing of all sashes, doors, molding and the toilet and smoking-room partitions is of mahogany. The flooring is a No. 22 gage Chanarch, covered with 1 in. of Flexolith. The Chanarch is riveted to all longitudinal members in the underframing and thus serves as a diagonal bracing. In the aisle the top surface of the Flexolith flooring is depressed ¼-in. below the surface of the floor beneath the seats. This depression is covered with ¼-in. battleship linoleum thoroughly cemented to the floor. The roof is reinforced with steel carlines forged from ½-in. x 1¼-in. bars and concealed between the wooden carlines. The lower ends of these carlines were forged so that they could be riveted to the body side-plate angle.



NORTHERN OHIO TRACTION'S STEEL CAR—CROSS-SECTION OF CAR AND POST SECTIONS

INTERIOR EQUIPMENT

A feature of these cars appears in an interior lighting system similar to the Cleveland Railway's standard, which consists of six 94-watt lamps on a single circuit installed along the center line of the car body, with an extra lamp arranged in the circuit so that it may be cut in through a selector switch in case one of the six lamps in the car lighting system burns out. In addition to these there is a 23-watt side lamp on the deck rail at each panel post. This arrangement of the lighting system required three circuits, whereas the system employed on the old-type steel underframe cars required



NORTHERN OHIO TRACTION'S STEEL CAR—FLOOR PLAN OF CAR five circuits. An Ohio Brass Company's signal system, including storage battery emergency lamps in the markers and tail lights, was also installed. A pilot lamp in the car advises the conductor of the condition of these lamps.

Other specialties in these cars include a Westinghouse straight and automatic air-brake system with D2-E 25-ft. air compressors, Brill 27-MCB-2 trucks, Tomlinson automatic couplers, Hale & Kilburn seats, Acme Supply Company's curtain fixtures, Edwards automatic closing trapdoors equipped with a self-folding device, Peter Smith OC-2 hot-water heaters of the double-circulating system type, the Cleveland Trolley Supply Company's ticket holders, Electric Service Supply Company's signal gongs, Nichols-Lintern air sand boxes, sand valves and sand traps, Crouse-Hinds arc and incandescent head lamps, Knutson trolley retrievers, Peacock hand brakes, a 15-ton Barrett jack in the emergency tool box and a Pyrene fire extinguisher.

As shown in one of the accompanying illustrations, the bus line receptacles providing for train operation are all installed on a wooden block mounted on the vestibule dash. The back of this block is cut to fit the dash, and it is fastened to it with a rubber gasket for weatherproofing purposes. This block serves as an insulator, and the dash is cut away from behind the block to permit the bus lines to connect with the receptacles. A plug for the headlight was also provided in this block so as to shorten the leads. These cars were designed and built under the supervision of J. G. Swain, general superintendent of power and shops, and P. J. Wood, superintendent of shops, under the direction of Charles Currie, the vice-president and general manager of the Northern Ohio Traction & Light Company. The cars were built in the shops of the Jewett Car Company, Newark, Ohio.

NORTHERN OHIO TRACTION'S STEEL CAR—INTERIOR VIEW OF CAR

The Fort Smith (Ark.) Traction Company in its application before the State Tax Commission has secured a reduction in assessment from $1,016,260 in 1915 to $800,000 for 1916. This was the greatest reduction of any public utility company in Arkansas .

Recent Decisions and Inventories*

Inventories Should Be Classified as to Age, Condition, Use and Extent of Use of Each Class of Service

BY PHILANDER BETTS
Chief Engineer Board of Public Utility Commissioners of New Jersey

THE result of recent decisions is that inventories and the resulting appraisals must be classified. As far as the engineer is primarily concerned with cost, the inventory and appraisal will arrive at the same aggregate in any case, but the engineer is further concerned with the use and operation of the property, and it is his duty to determine to what extent each class of property is required in the service of the public and to what extent it is required for the furnishing of the various classes of service. In preparing the inventory, therefore, such classifications must be made as will readily show the use to which the property is devoted.

As to calculations for depreciation, while the so-called Idaho decision is to the general effect that full or theoretical depreciation should not be deducted in obtaining the fair value of the property, it cannot be said that this principle is at all well established, and it becomes necessary, in the inventory, to determine the accrued depreciation of each item, taking into account not only ordinary wear and tear, but obsolescence and inadequacy (which some authorities call functional depreciation). The writer has long been of the opinion that in order to square valuations with the court decisions, engineers must (1) obtain definite appraisals of the existing physical property, (2) ascertain the full theoretical depreciation, and (3) make such deductions as are necessary because of property built unwisely or for anticipated increases in population which have not materialized or for classes of service which have not been taken on.

In making the appraisal of the physical property, due allowance must be made for overhead charges. In addition there are allowances for various intangibles not properly included under the head of overhead charges. They are (1) cost of organization and obtaining the necessary charters and franchises, (2) deficits in operation in the early history of the project, (3) lack of profits in the later years, and (4) the unearned depreciation which has accrued. It is the province of the engineer to investigate and determine the various items referred to with the exception, perhaps, of items concerning the cost of organization and obtaining the necessary charters and franchises.

The foregoing items should be considered as making up the cost of establishing the business. There has been much contention with reference to the necessity of including going value, but here one is confusing cases involving justice to the investor with purchase and sale cases. Going value is an element to be considered in purchase and sale cases and has no pertinency whatever in rate cases. The United States Supreme Court, in its recent decision regarding the Des Moines gas rates, decided that going value was to be considered in these cases, but based its estimates of going value on those elements which go to make up the cost of establishing the business. In the determination of reasonable or fair rates, full consideration must be given to the sacrifice made by the investor. This will include, in addition to the investment in the physical property, early losses, lack of profits and unearned depreciation, the aggregate of which should be classified as the cost of establishing the business.

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*Abstract of paper presented before meeting of American Institute of Electrical Engineers in New York City on Nov. 10.

In conclusion, it may be said that:

1. Property must be inventoried in such detail as will lead to a determination of its value or cost within a very small percentage of absolute accuracy.
2. It must be classified as to its use and as to the degree of its use in the various classes of service.
3. The inventory must include full information as to age and present condition, this information leading to accurate estimates of accrued depreciation.

Continuous Inventories—Their Value and Preparation*

Four General Groups of Property Suggested, with Forms and Methods of Collecting and Recording Data

BY HARRY E. CARVER
Assistant Engineer Board of Public Utility Commissioners of New Jersey.

A PERPETUAL inventory of property would be useful to any company in the following ways:

1. Data are made available for answering promptly any complaints as to discrimination or overcharges in existing rates.
2. The increased cost of labor and material renders it probable that many rate cases in the future will involve increases, and the company will need to be fortified with all necessary facts as to the cost of service rendered.
3. One of the most urgent reasons for making an inventory and keeping it up to date will probably be the necessity of having some means for judging whether or not a company is making reasonable preparation for renewing its property.
4. The labor and time involved in securing commission approval of security issues on the part of the company and of the commission would be materially reduced by a continuous inventory. There would be less interruption of company work by governmental inspectors in checking up construction expenditures or making a complete appraisal.
5. The market for a company's securities would, doubtless, be increased by a general knowledge that a running inventory of all the company's property was maintained and consequently that some check was available upon property.
6. A continuous inventory would probably make available data for securing franchise extensions from various municipalities under more equitable terms than appears to be possible at present.
7. Data would be available for making investigations to satisfy the demands of labor.
8. A continuous inventory would be conducive to much more accurate distribution of charges between fixed capital and operating expenses as well as of general overhead charges.
9. Insurance adjustment for fire and other losses could be more readily and equitably obtained.
10. Tax commission reports and yearly reports to regulating bodies could be more readily compiled.

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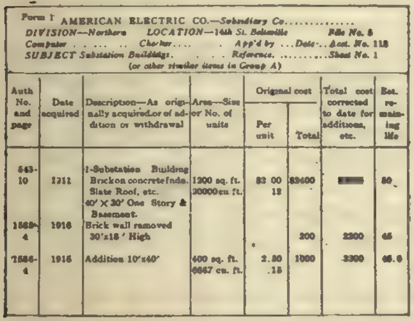
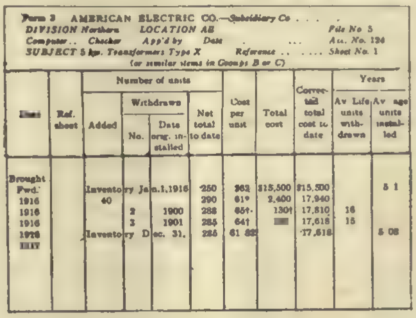
*Abstract of paper presented before meeting of American Institute of Electrical Engineers in New York City on Nov. 10.



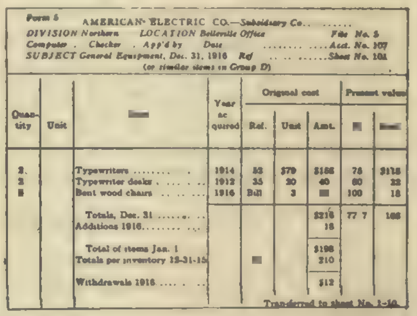
Form 1 AMERICAN ELECTRIC CO.—Subsidiary Co..............
DIVISION—Northern LOCATION—14th St. Belleville File No. 5
Computer . . .. Checker.... . App'd by ...Date...Acct. No. 118
SUBJECT Substation Buildings. . . . Reference. ....Sheet No. 1
(or other similar items in Group A)

Auth No. and page	Date acquired	Description—As originally acquired or of addition or withdrawal	Area—Size or No. of units	Original cost		Total cost corrected to date for additions, etc.	Est. remaining life
				Per unit	Total		
543-10	1911	1-Substation Building Brick on concrete fndn. Slate Roof, etc. 40'×30' One Story & Basement.	1200 sq. ft. 20000 cu. ft.	$2 00 12	$2400	[illegible]	50
1563-4	1916	Brick wall removed 30'x18' High			200	2200	45
1586-4	1916	Addition 10'x40'	400 sq. ft. 6667 cu. ft.	2.80 .15	1000	3200	46.6



Form 3 AMERICAN ELECTRIC CO.—Subsidiary Co . . .
DIVISION Northern LOCATION All File No 5
Computer.. Checker App'd by Date ... Acc. No. 124
SUBJECT 5 kw. Transformers Type X Reference .. .... Sheet No. 1
(or similar items in Groups B or C)

[illegible]	Ref. sheet	Number of units				Cost per unit	Total cost	Corrected total cost to date	Years	
		Added	Withdrawn		Net total to date				Av. Life units withdrawn	Av. age units installed
			No.	Date orig. installed						
Brought Fwd.		Inventory Jan. 1, 1916			250	$62	$15,500	$15,500		5 1
1916		40			290	61*	2,400	17,940		
1916			2	1900	288	65†	130†	17,810	16	
1916			3	1901	285	64†	[illegible]	17,618	15	
1916		Inventory Dec. 31,			285	61 82		17,618		5 08
[illegible]										



Form 5 AMERICAN ELECTRIC CO.—Subsidiary Co.. ......
DIVISION Northern LOCATION Belleville Office File No. 5
Computer . Checker . App'd by Date ....Acct. No. 107
SUBJECT General Equipment, Dec. 31, 1916 Ref .. ..Sheet No. 101
(or similar items in Group D)

Quantity	Unit	[illegible]	Year acquired	Original cost			Present value	
				Ref.	Unit	Amt.	[illegible]	[illegible]
2		Typewriters	1914	53	$79	$158	75	$118
2		Typewriter desks	1912	35	20	40	80	32
6		Bent wood chairs	1916	Bill	3	[illegible]	100	18
		Totals, Dec. 31				$216	77 7	168
		Additions 1916........ ...				18		
		Total of items Jan. 1				$198		
		Totals per inventory 12-31-15		[illegible]		210		
		Withdrawals 1916..... . ..				$12		

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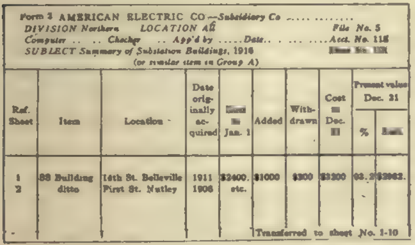

Form 2 AMERICAN ELECTRIC CO—Subsidiary Co ....
DIVISION Northern LOCATION All File No. 5
Computer .. .. Checker .. App'd by .....Date.. . ...Acct. No. 118
SUBJECT Summary of Substation Buildings, 1916 [illegible]
(or similar item in Group A)

Ref. Sheet	Item	Location	Date originally acquired	[illegible] Jan. 1	Added	Withdrawn	Cost [illegible] Dec. [illegible]	Present value Dec. 31	
								%	[illegible]
1	SS Building	14th St. Belleville	1911	$2400.	$1000	$200	$3200	93.2	$2982.
2	ditto	First St. Nutley	1906	etc.					

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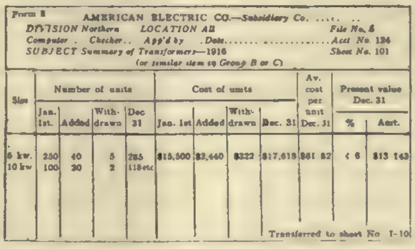

Form 4 AMERICAN ELECTRIC CO.—Subsidiary Co. ....
DIVISION Northern LOCATION All File No. 5
Computer . Checker.. App'd by .Date...........Acct No. 124
SUBJECT Summary of Transformers—1916 Sheet No. 101
(or similar item in Group B or C)

Size	Number of units				Cost of units				Av. cost per unit Dec. 31	Present value Dec. 31	
	Jan. 1st.	Added	Withdrawn	Dec 31	Jan. 1st	Added	Withdrawn	Dec. 31		%	Amt.
5 kw.	250	40	5	285	$15,500	$2,440	$322	$17,618	$61 82	[illegible] 6	$13 143
10 kw	100	20	2	118 etc.							

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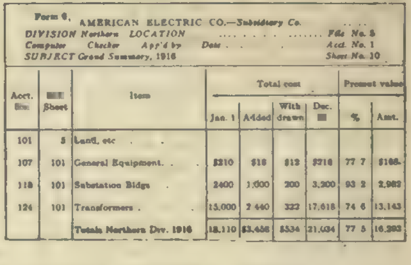


Form 6. AMERICAN ELECTRIC CO.—Subsidiary Co. .. ..
DIVISION Northern LOCATION .... File No. 5
Computer Checker App'd by Date . . . Acct. No. 1
SUBJECT Grand Summary, 1916 Sheet No. 10

Acct. [illegible]	[illegible] Sheet	Item	Total cost				Present value	
			Jan. 1	Added	With drawn	Dec. [illegible]	%	Amt.
101	5	Land, etc . .						
107	101	General Equipment. . .	$210	$18	$12	$216	77 7	$168.
118	101	Substation Bldgs .	2400	1,000	200	3,200	93 2	2,982
124	101	Transformers . .	15,000	2 440	322	17,618	74 6	13,143
		Totals Northern Div. 1916	18,110	$3,458	$534	21,034	77 5	16,293

CONTINUOUS INVENTORY—SPECIMEN FORMS FOR ORIGINAL ENTRIES AND SUMMARIES OF VARIOUS PROPERTY GROUPS

Notes on Form 1:

(a) If any item of property subject to depreciation is acquired subsequent to date of first use, this fact should be indicated together with other information available as to original construction, date, cost, etc.

(b) Remaining life of 45 years is obtained by subtracting 5 years elapsed between 1911 and 1916 from 50 year life first estimated.

Remaining life of 46.6 years is obtained by computing a weighted average of $2,200 at 45 years and $1,000 at 50 years.

(c) Present value on a basis of straight line depreciation may be readily obtained by multiplying $3,200 by ratio of 46.6 years to 50 years, giving 93.2 per cent and $2,982.

Notes on Form 3:

*Average costs for all units of this size for any given period—say one year.

†Prices might be averaged and one figure shown or, if not much variation in price, they might be withdrawn at the average cost of the 250 shown at the beginning of the year.

Notes on Form 4:

(a) Columns on left of form for "Reference Sheet" and "Type" have been omitted in reproduction.

(b) The sign "%" under "Present Value" for straight line depreciation would usually be obtained by comparing average age of units installed with average life of units withdrawn. In this case it is estimated that a 15 or 16 year life is not long enough and life base is arbitrarily taken as 20 years. In some cases it might be desirable to consider salvage in arriving at present value but it is disregarded above for sake of brevity.

Notes on all forms:

(a) Loose leaf sheet (8½ in. x 11 in.) is recommended for all forms.

(b) For all withdrawals use red ink.

(c) Forms 1 and 3 constitute the continuous record. All other forms are made up when it is desired to arrive at totals and are correct for one date only. If periods used are different than calendar year, forms would be slightly modified.

(d) Provision for identifying computers, etc., on Forms 1 and 3 after first entries could be made by having initials inserted in date column or by providing separate column.

(e) Figures carried to grand summary, Form 6, are merely illustrative and not the totals which would be obtained if more entries were made on Forms 2, 4 and 5.

(f) From totals on Form 6, the amount of additions for which new securities may be issued may be readily determined.

(g) By comparing Form 6 as filled out for 1915 with year 1916, the credit which must be made to reserve account from earnings to provide for the year's depreciation may be determined.

11. A continuous inventory would necessitate the keeping of records which would prevent the lack of correct information regarding the location of property, such as underground conduits, etc.

12. Detailed costs would readily be available from which the costs of rendering any particular service or of making any particular extension or betterment could be accurately determined.

PREPARATION OF THE INVENTORY

As most companies have not a complete inventory and appraisal of their property, however, it seems advisable to state that a company can readily start an inventory of all new property acquired from the present time forward and all old property withdrawn from service and either replaced or abandoned, without detailing a special force of engineers to make a complete inventory of all property. The record of old property can be obtained when the company's engineers and accountants may be available for this work.

The fundamental requirement is an efficient "work order" system. Such a system is in force in practically every company of appreciable size to-day, and with more or less modification can be adapted to give the records required. In order to obtain the necessary records for writing off the original cost of the property when it is retired, however, it is absolutely necessary that one additional step be added to this system as it is generally in force in most companies, *viz.*, an allocation of the cost of each piece of construction or property acquired must be made in detail when the work is completed, and preferably just before the work order is finally closed, as such an analysis will frequently disclose inaccuracies in either debits or credits. This practice is followed by many companies to a certain extent at the present time, but must be applied to all work orders, and the final cost must be reduced to the same units that are likely to be needed in making estimates for withdrawals or additions.

DIVISIONS OF PROPERTY ITEMS

The items of property for the purposes of inventory may be divided into four general groups as follows: (*a*) Those items which are large enough to be recorded individually or in small groups with one entry, but which are likely to be altered or changed in part; *e.g.*, buildings. (*b*) Items which may be recorded individually and which are withdrawn from service as a unit; *e.g.*, meters. (*c*) Items which must be recorded in units of length, pounds, or some similar units and miscellaneous items; *e.g.*, wires and cables, insulators, arresters, etc. (*d*) Those items of property which are usually carried in inventories at the present time and which are usually checked up by field inventory at regular intervals; *e.g.*, materials and supplies, portable tools, office furniture, etc.

There may be considerable difference of opinion as to just what method should be followed in collecting the data required, but a general scheme could be followed for a gas, electric railway or railroad, telephone or telegraph, water or sewer utility or a private industrial plant by classifying the property in the general groups indicated above about as follows:

(*a*) 1. Land and right-of-way. 2. Building and structures. 3. Equipment of stations, buildings, etc.

(*b*) Poles, transformers, meters and services for an electric company; meters, services, fire hydrants, lamps, etc., for a water or gas company, and similar items for these or other companies.

(*c*) Wires, cables, conduits, crossarms, insulators, for an electric company; feeder cable, trolley wire, straight track, etc., for railways; transmission and distribution mains for water, gas and sewer companies.

(*d*) Office equipment, shop equipment, stable equipment, etc.

FORMS TO BE USED

The general form of recording data for items in group (*a*) in detail is given on Form 1. These data should be obtained from the completion report of the work order, an extra copy of which it might be advisable to file with other inventory data. The basis for estimating the unit prices for the cost of brick wall removed (mentioned on Form 1) should be found in this completion report. A list of the quantities involved should be available from the information and plans in the hands of the engineer responsible for the new addition. The summary of all such property classified under any particular account for any particular division or subdivision could be recorded on Form 2.

The same forms (3 and 4) are recommended for both groups (*b*) and (*c*), but the methods of collecting the data required are different. For both groups it is thought best to use unit costs averaged for the district into which the company chooses to subdivide its territory, say a tax district, and for a certain period of time, monthly, quarterly or yearly. The average for labor, storeroom charges, miscellaneous material items, overhead charges, etc., would necessarily need to be computed after the close of the current period or the average taken from the preceding period and final adjustments made for variation. The total quantities for all items in group (*b*), for which a card record is assumed to be made, can be computed more readily from the cards or from the completion reports of the work orders. For all items in group (*c*), the totals of both quantities and prices would probably best be obtained and reconciled with the amounts given in the completion reports of all work orders involved, although they might be obtained from field books, street maps, or pole record and manhole record cards. Form 3 shows method of recording a group of similar units, *viz.*, 5-kw. transformers, and Form 4 shows method of summarizing units of various sizes.

Form 5 is recommended for summarizing items in group (*d*). The first entry for each of these items is naturally the cost new, and it is recommended that this cost new be carried in the inventory in a parallel column with the depreciated value until such time as the item is retired; that the total cost new of all items be carried in the property account; and that the estimated accrued depreciation of all such items be carried in the depreciation reserve account instead of being charged directly to operation each year and lost sight of thereafter as is the practice with many companies to-day. A comparison of such an inventory at the end of any year with the preceding one will indicate the total value of all withdrawals and additions, and a proper adjustment can then be made in one lump sum between the capital account and the depreciation reserve.

Form 6 is to be used as a summary of all property, and probably needs no explanation in addition to notes given.

To carry out the above, it would seem advisable to create a separate department under the joint supervision of the chief engineer, general auditor or controller, and the official in charge of the public relations committee of the utility if such a committee exists. The man in charge of this department should understand engineering, accounting and statistical work, and be capable of co-operating with all other departments of the company to secure the full benefits possible to be derived as outlined in the first section of this paper.

TYPICAL FREIGHT TRAIN ON TOLEDO & WESTERN RAILROAD

An Electric Railway Operating Under Steam Road Conditions

The Author's Statements Show That the Toledo & Western Railroad Has Been a Potent Factor in the Prosperity of the Territory Which it Serves

By A. SWARTZ
Vice-President Toledo & Western Railroad, Toledo, Ohio

THE Toledo & Western Railroad is an electrically operated line handling steam railroad business on its main line between Toledo and Pioneer, Ohio, a distance of 59 miles, and between Allen Junction, a point 16 miles west of Toledo on the main line, and Adrian, Mich., a distance of 21 miles. The road parallels the Lake Shore & Michigan Southern Railroad over the entire length of the Adrian branch. Steam railroad connections are provided through the Toledo Terminal Railroad, a belt line connecting with all steam roads entering Toledo. There are four other steam road connections along the line, and the Toledo & Western has many through rates with the steam roads. The main line is not paralleled by any steam road. This line passes through Sylvania, Metamora, Lyons, Ohio, and Morenci, Mich., and Fayette, Ohio, into Pioneer, Ohio. The Adrian branch passes through Blissfield, Mich., to Adrian, a city of 11,000 inhabitants.

Steam Railroad Connections

The Toledo & Western Railroad is organized on the same lines as a steam road and, in fact, is accepted as such by a number of steam roads that interchange business and co-operate by granting divisions of freight rates. Physical track connections are in use at Fitch, Ohio, with the Toledo Terminal Railroad; at Franklin, Ohio, and Adrian, Mich., with the Wabash Railroad, and at Dennison, Ohio, with the D., T. & I. R. R. It is a member of the American Railway Association and the Central Freight Association, representative steam road organizations.

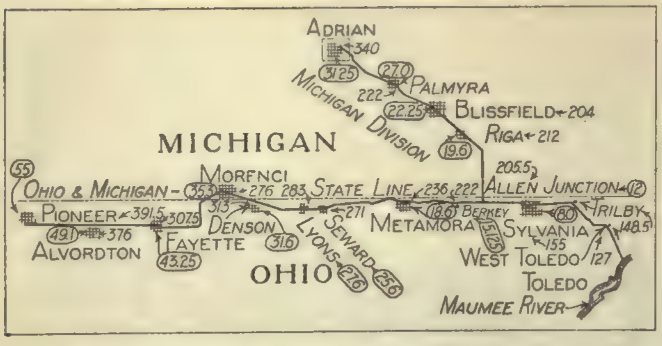
The railroad was built about fourteen years ago to tap territory along the main line, which was very much in need of railroad facilities. At that time the average farm land along the route was worth in the neighborhood of $75 per acre, whereas now it ranges from $125 to $200 per acre. The road traverses a very rich farming country, consisting at present of a large acreage of sugar beets. The annual yield of 2500 acres of sugar beets, at least 25,000 tons, is hauled to Blissfield, Mich., to a large sugar factory having a capacity of 1000 tons of beets per day, the equivalent of 125 tons of refined sugar. Besides this, the yield of 7500 acres is hauled to this factory from other sources, and the beets from an acreage of 1200 are taken to Toledo.

Classes of Traffic Handled

The passenger traffic on this road is approximately 70,000 passengers per month. Passenger trains are operated at a schedule speed of 20 m.p.h. The low average schedule speed is due to the time required in incorporated towns. Outside of these the schedule speed approximates 30 to 35 m.p.h. From West Toledo to Sylvania, Ohio, a distance of 8 miles from the Toledo interurban station, the contiguous property is being rapidly developed as suburban homes, and affords quite a suburban traffic, although at the present time this traffic is somewhat erratic and barely pays for the service given.

The regular freight schedule comprises one local and four package freights each way per day. One of the package freights is used on a milk route, and hauls, in addition to its load, two cars of bottled milk daily from Morenci to Toledo. These cars are refrigerated with cold air, and reach their destination in the hottest weather with a temperature not exceeding 42 deg. Fahr. The milk express revenue has increased during the last four years from $5,000 to $35,000, and it is expected that it will reach $100,000 in the next two years. A large sugar beet business is also handled. Approximately 60,000 tons of sugar beets are handled in thirty days during the sugar beet season, practically all in the month of October. For this business about 1800 cars are required, each of these cars having an average haul of 20 miles.

The necessity for package freight cars will be read-



OUTLINE MAP OF TOLEDO & WESTERN RAILROAD

Elevations shown by figures not encircled. Datum is that used by city of Toledo; 91.7 on this datum being mean lake level at Toledo, which is 573 ft. above mean sea level. Figures encircled represent miles from West Toledo.

ily understood when it is stated that during 1914 about 15,000 tons were handled in this manner. The carload business amounts to about 8000 cars per year, and in addition to sugar beets consists principally of crushed stone for road purposes, coal, live stock, hay, grain, logs, sugar and lumber. The total tonnage handled during the two years past shows the following increases for the year 1915 over 1914: 17 per cent for loaded cars, 14 per cent for ton-miles of loaded cars, 12 per cent for car-miles of loaded cars, 14 per cent for empty cars, 32 per cent for ton-miles of empty cars, and 16 per cent for car-miles of empty cars.

The United States government has authorized a regular mail-car service on this road. The car which is used carries a mail clerk and makes trips daily except Sunday from Toledo to Pioneer and return. The Wells Fargo Express Company maintains express service on all freight and on some passenger trains. While at present this is not a source of great revenue, it is expected that the business will grow materially.

TRACK, POWER SUPPLY AND SHOPS

In railroad parlance this road was "built on the ground," and there are some very short heavy grades and sharp curves. The grades, however, do not exceed 75 ft. per mile, with one exception at Adrian, Mich., where one of 100 ft. per mile is encountered. Fortunately, practically no freight has to be handled over this grade. The curvature in most cases does not exceed 10 deg. The track is laid with 60-lb. rails, on cedar ties on tangent track and on oak ties on curves. It is well ballasted with cinders, gravel and crushed stone.

Power to operate the line is purchased from the Toledo Railway & Light Company. The sale of current for lighting to villages, private business concerns, and residences forms a fairly lucrative business, and it is hoped that it may soon grow to produce about $100,000 yearly revenue.

The line is operated at a trolley voltage of 550, direct-current, the power being transmitted over a high-tension line at 13,000 volts. There are nine rotary converter substations. The transmission line will probably be rebuilt in the near future for operation at 33,000 volts to provide for an expected increase in the business of the company.

At Toledo joint freight house and passenger depot facilities, provided by the Toledo Railway & Light Company, are used in common with eight other interurban systems. The shops are located at Sylvania, Ohio, where running repairs to freight equipment are made. The heavy repairs to passenger cars and electric motive equipment are made at the Central Avenue shops of the Toledo Railway & Light Company in Toledo.

ROLLING STOCK AND ITS EQUIPMENT

The company owns and operates fourteen passenger coaches, two of which are of the latest type of construction, five package freight cars for small-lot freight, five electric locomotives for carload freight, and 115 freight cars of the same types as those used on steam roads. The two new passenger coaches and five package freight cars are equipped with Westinghouse motors and control.

In order to handle the increased traffic the company has recently placed in operation a 60-ton Baldwin-Westinghouse electric locomotive. The locomotive hauls a trailing load of 2400 tons, although this is in excess of the manufacturers' rating. It has actually pulled the equivalent of 3500 tons on level track. It is of the

CONTROL APPARATUS ON NEW T. & W. R. R. ELECTRIC LOCOMOTIVE

CLOSER VIEW OF OPERATOR'S CORNER OF T. & W. R. R. LOCOMOTIVE eight-wheel, swivel-truck type, with double-end control, and is adapted to freight and switching service.

The equipment comprises four commutating-pole motors of the field-control type and HLF control. Field control was selected because the trolley voltage is sometimes quite low and the substation capacity is limited. While the full field is designed primarily for acceleration it may also be used to some extent in slow-speed running. The control equipment is mounted in a grounded expanded-metal cage.

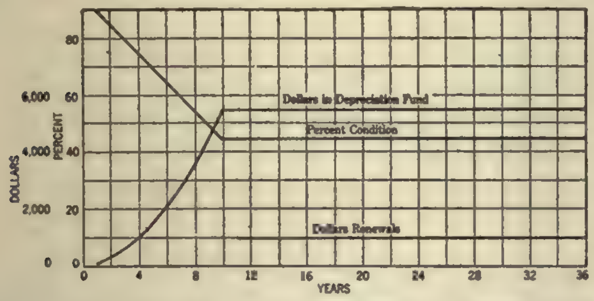
With forced ventilation the main traction motors have sufficient capacity to exert continuously a tractive effort of 9400 lb. at 600 volts. The locomotive can exert a tractive effort of 20,000 lb. at 9.75 m.p.h. The maximum safe speed is 40 m.p.h.

Growth and Depreciation*

Manner of Company's Growth Affects Per Cent Condition—Property Does Not Settle Down to Fixed Per Cent Condition

BY JULIAN LOEBENSTEIN
Junior Electrical Engineer, Public Service Commission of New York, First District

THE following definitions and assumptions are used. By liquid depreciation reserve fund is meant a reserve either as cash in a bank, invested in bonds or employed in any other way so as to be readily convertible into cash for immediate use. This is to distinguish it from depreciation reserve which is invested in extensions and betterments and which cannot be readily turned into available cash. No consideration is taken of scrap value or of a reserve for emergencies or catastrophies, as the calculations are not in any way affected thereby, the effect being simply to refer them to a different ordinate. All calculations are on the straight line basis, and all property is assumed to be kept in the best state of repair.

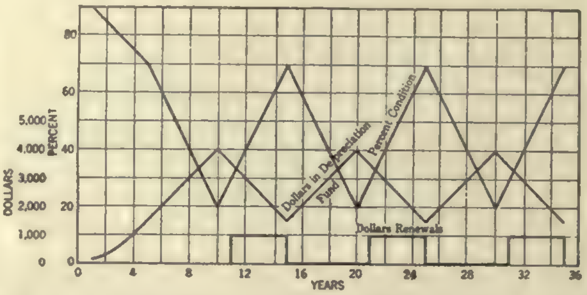


Growth and Depreciation—Curve I—Uniform Investment for Ten Years; End of Growth, Tenth Year; Life, Ten Years. Depreciation Reserve Not Invested in Extensions.

Per Cent Condition Affected by Manner of Growth

It is generally considered that a property maintained in good operating condition will be between 70 and 85 per cent new. In fact, Whitten, in his "Valuation of Public Service Corporations," says: "It has been stated that a street railway maintained in good operating condition will necessarily show cost less depreciation of from 70 to 85 per cent of the cost new." It is now an easy matter to prove that Mr. Whitten's assumption is wrong, and that the per cent condition of any property is dependent not only on the maintenance, but upon the past and present growth.

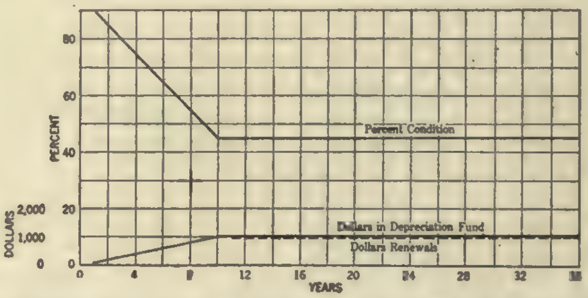
In Curve I, where there has been a uniform investment over a term of years corresponding to the life of the property, the per cent condition varies from 90 to 45 during that term, and then stays at 45 when the property stops growing. In Curve II, where there is a uniform investment over a term of years not corresponding to the life of the property, the per cent condition varies from 90 to 70 while the property is growing. After that it varies in repeating cycles from 70 to 20 and back to 70 again. This, of course, is an extreme case, but it shows the possibilities of variation.



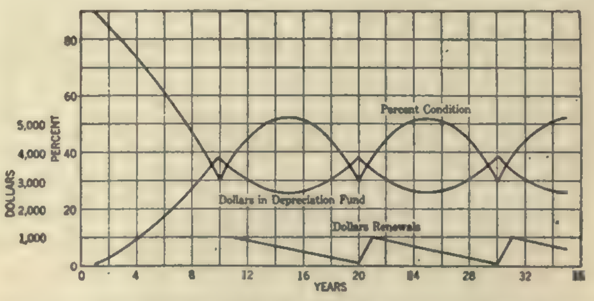
Growth and Depreciation—Curve II—Uniform Yearly Investment for Five Years; End of Growth, Fifth Year; Life, Ten Years. Depreciation Reserve Not Invested in Extensions.

Curve III shows the same characteristics as Curve I, although there was no reinvestment of reserve in the latter. Curve IV shows a more complicated property than the others. Here the variation during the ten years the property is expanding is from about 92 to about 67. It then goes through a cycle the period of which is twenty years, varying from 67 to 35 per cent and back again.

Curve VI is for an actual electric property. The company was assumed to have reached its final growth on Dec. 31, 1913, after which date only renewals were made. The total service value of all the property was approximately $16,500,000, yet it may be seen from the curve that the actual service value varies from $6,200,000 to $11,000,000, or from 37.5 per cent to 69 per cent. Even if some assumptions as to probable life are incorrect, the property will still vary over a wide range and not be in any popularly supposed fixed condition somewhere between 70 and 85 per cent. Curve VIII is for another actual property, but a much smaller



Growth and Depreciation—Curve III—Uniform Yearly Investment for Ten Years; End of Growth, Tenth Year; Life, Ten Years. Depreciation Reserve Invested in Extensions.



Growth and Depreciation—Curve IV—Decreasing Yearly Investment for Ten Years; End of Growth, Tenth Year; Life, Ten Years. Depreciation Reserve Not Invested in Extensions.

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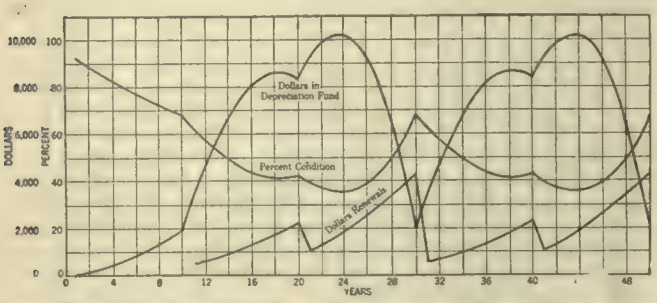
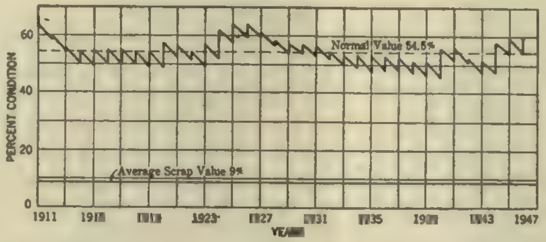
*Abstract of paper presented before meeting of American Institute of Electrical Engineers in New York City on Nov. 10.

one than that considered in Curve VI. The property is assumed to reach its full growth in 1912, and the remaining service value is shown for the next fifty-three years. The service value varies from $810,000 to $370,000, or a corresponding per cent variation from 77 to 35.



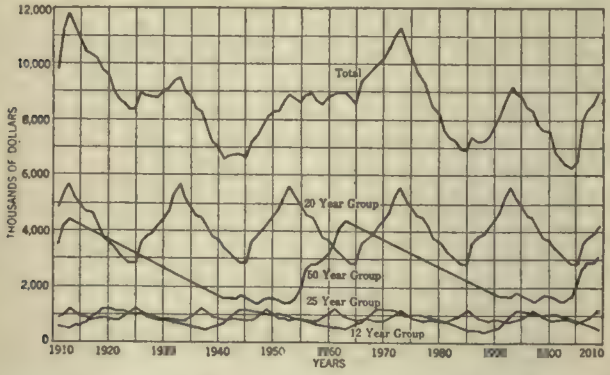
Growth and Depreciation—Curve V—Increasing Yearly Investment for Ten Years; Life, One Group, Ten Years—One Group, Twenty Years; End of Growth, Tenth Year. Depreciation Reserve Invested in Extensions.

James E. Allison, in a report on the United Railways of St. Louis, presented Curve VII. He said: "It has been the purpose of the writer to show by diagrams that piecemeal built properties of any complexity will eventually assume a theoretical value curve, closely conforming to the straight normal value line, halfway between 100 per cent and the composite scrap value of the property." It cannot be denied that the curve which he gives most certainly is a uniform curve and tends to support his theory. It should be noted, however, that even his curve varies over a range of 15 per cent during the comparatively short time of thirteen years. When compared to Curves VI and VIII, it shows the danger of drawing a general conclusion from any one curve. Every complex property undoubtedly displays the tendency which Mr. Allison points out, but each property should be investigated separately to determine its characteristics in this respect.



Growth and Depreciation—Curve VII—Total Composite Theoretical Value Curve Depreciable Property of the United Railways of St. Louis.

Only when there has been a uniform growth over a term of years corresponding to the life of the property (Curve I) will a property reach a fixed condition and remain there after it has stopped growing. As long as a property is growing, whether uniformly or otherwise, there will be a variation in its per cent condition. In other words, there is an obligation to renew varying amounts of property in different years in the future, and any calculation of reserves based on an assumption that because of perpetual life the company will reach a stable condition either during or after its growth is entirely incorrect.

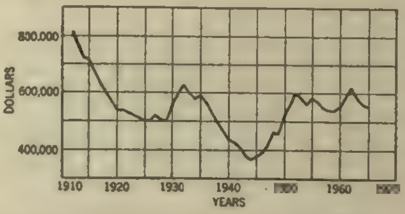


Growth and Depreciation—Curve VI—Depreciated Service Values of an Actual Property; End of Growth Assumed Dec. 31, 1913; Original Service Value $16,500,000; Maximum Per Cent Condition, 69; Minimum Per Cent Condition, 37.5.

While the property is growing the per cent condition is decreasing, the rate of decrease varying inversely with the rate of growth. When the property stops growing it has reached a certain per cent condition, and thereafter it varies between that condition and some other, dependent upon the manner of growth. When the growth stops, the property may be at a minimum per cent condition, as in Curve IV, where there has been a decreasing rate of growth; or at a maximum, as in Curve V, where there has been an increasing rate of growth. Each property, should it stop growing, will go through a cycle in which it reaches a certain maximum condition less than 100 per cent, this maximum condition being entirely dependent on the manner of the property's growth.

How to Handle Depreciation Reserve

Since it will never be necessary to renew the entire property, some of the reserve necessary to return it to the 100 per cent condition may be dispensed with. It is not correct, however, to say that since the reserve will never be needed it should not be obtained. The stockholder has a right to expect that his capital shall be kept intact at 100 per cent.



Growth and Depreciation—Curve VIII—Depreciated Service Values of an Actual Property; End of Growth Assumed Dec. 31, 1912; Original Service Value, $1,056,917; Maximum Per Cent Condition, 77; Minimum Per Cent Condition, 35.

When a company is growing at a rate to permit the investment of all the reserve in extensions, as in other cases, the annual charge for depreciation will in some years be less and in some years more than the cost of renewals. In those years when the cost of renewals is less than the charge for depreciation, the difference may be invested in extensions, and in those years when the cost of renewals is greater than the depreciation charge, it will be necessary to issue securities with the extensions made from reserve as a basis, the money from the securities being used for the renewals. The securities, however, should not be issued to an amount greater than the depreciated value of the extensions. Separate accounts should be kept for capital investment and reserve investment.

For a company which has stopped growing or for one which is growing at a rate not large enough to use all of the depreciation reserve for reinvestment in extensions, it will be necessary to have a continually varying amount in a liquid depreciation reserve fund, and this amount will fluctuate in a manner depending upon the company's growth. Curve V shows the condition for a property which has ceased to grow after ten years. At the end of the tenth year there is $1,953 in the reserve. Since the $1,953 will never be used as far as renewal purposes go, and the company has stopped growing, it may as well be returned to the stockholders. It should be clearly understood by the stockholders that this is a return on capital invested and not a dividend payment.

RETURNS SHOULD BE ALLOWED ON DEPRECIATION FUND

The same return should be allowed on a depreciation fund as on any other capital invested in the property, and such a return should be available for dividends, provided cost new, less depreciation, is to be used as a basis for rate making. The capital which is wasting away is certainly the capital of the stockholder. He uses up his capital in the service of the consumer, and the consumer replaces the capital so used. The replaced capital in a depreciation reserve fund should be treated the same as any other capital. It should be allowed the same return and for the same purposes.

Suppose that an appraisal were made in the twenty-first year (Curve V), when the property was in a 39 per cent condition. Under this scheme the rates would depend entirely upon the condition of the property in the year it was appraised, and there can be no question as to the unfairness of such a proceeding. The rates should be based on the depreciated value of the property in any year plus the amount in the depreciation reserve, provided only that the sum is not greater than the original capital investment.

Old and New Doherty Cadets at Banquet

NEARLY fifty Doherty cadets, graduates and undergraduates participated in a "get-together" banquet on Oct. 31 at Fraunce's Tavern, New York City. The purpose was to acquaint the large number of young cadets in the New York office with the executives, almost all of whom are graduates of the Denver school. The series of addresses not only told of the past in the Doherty organization, but forecast the future. Frank W. Frueauff, of the firm of Henry L. Doherty & Company, acted as toastmaster.

Holton H. Scott, general manager of the operating department, announced his claim to be the dean of the Doherty college men now in the organization, and rehearsed the connection of Henry L. Doherty with the Madison Gas & Electric Company. Mr. Scott said that the cadet school idea proved so successful in Denver that another has been started in Toledo and a third in Bartlesville for the study of the natural gas and oil problems, and the plans for a fourth, largely dealing with the oil-refining problems, are now being developed. Milan R. Bump, chief engineer, stated that never was the difficulty of finding men qualified to carry on the work of the company more acute than at present. In this connection it will be of interest to note that the systematic cadet work of this company has now been carried on for about ten years with eminently satisfactory results.

According to R. C. Griswold, chief technologist, who himself took the cadet course, the scheme has been considerably extended this year, this expansion being justified by the record of the Denver school graduates. In selecting cadets for the schools of practice, the company has confined itself almost entirely to graduates of electrical engineering courses. The principal value of this selection lies in the fact that young men who take engineering courses probably like engineering as a work, and have an especial aptitude in that line.

These men, as a class, do not like bookkeeping for the very simple reason that if they did like bookkeeping they would have taken a bookkeeping course and not an engineering course. Such success as these engineers make in bookkeeping, in spite of their dislike for that work, is due to their ability to attack these problems on a fundamental basis; and while a report from one of these men may be refreshingly unconventional as to form and treatment, they may always be depended upon to give correct answer.

Bureau of Standards Issues National Electrical Safety Code*

A Limited Edition of Bureau of Standard Circular No. 54 Is Published Under Date of Nov. 15, 1916

AFTER considerable preliminary circulation among affected interests the proposed National Electrical Safety Code is now available in complete form and under one cover. It forms a book of 323 pages. A few copies of the circular will be sent out at once to some special conferees and the general distribution will be made about Dec. 1. Copies can be procured from the superintendent of documents, Government Printing Office, Washington, D. C., at 40 cents per copy. The number of copies in this, the second edition, is limited, but it is probable that, if the demand warrants, an edition in handbook size will be issued immediately after the initial distribution and will contain the same text.

The ELECTRIC RAILWAY JOURNAL has kept its readers informed in detail as to the progress of the code during its development stage, which progress can be reviewed by consulting the references listed in the footnote appended to this column. These show that many conferences were held in the effort to meet the requirements of the industries and utilities concerned, and after a great many suggestions had been incorporated the code was to be issued for a year's trial in tentative form. The title page of the present edition states that the code is issued "for examination, trial and constructive criticism."

The code comprises four parts as follows: (1) A proposed national standard for safe construction and installation of electrical supply equipment in stations; (2) the same for electrical transmission, distribution and signal lines; (3) the same for the electrical utilization equipment of factories, offices and homes; and (4) a set of safety rules to be observed in work upon electrical equipment and lines.

In connection with the publication of this second edition of the code, the director of the Bureau of Standards states as follows: "After a trial period a modification of some of the rules will, of course, be found desirable. A revised edition will, therefore, be prepared as soon as necessary. Subsequent revisions should, however, be made at somewhat infrequent intervals in order to assure a reasonable degree of stability for electrical practice throughout the country. The advantages in this respect of a national code over various local codes are readily appreciated. The bureau desires to secure the experience of all the interests concerned with the code and hopes through the assistance of users and administrators of the code to make it as useful as possible in promoting safety and economy of electrical service."

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*For recent references to the National Electrical Safety Code, see the following issues of the ELECTRIC RAILWAY JOURNAL: April 3, 1915, page 673; April 17, pages 741, 750, 758; May 1, pages 825, 845; May 15, pages 939, 941; May 29, page 1036; June 19, page 1162; June 26, page 1189; Oct. 9, pages 697, 776; Oct. 16, pages 791, 839; Nov. 6, page 953; Nov. 13, pages 977, 996; June 3, 1916, page 1048.

Giving Local 100 Per Cent Service

Actual Performance of Such Service Considered as a Basis for Rate Valuation—Interest on Cost of Achieving Such Service Plus Cost of Maintaining It Should Equal Rates

By H. S. COOPER
Secretary Southwestern Electrical & Gas Association, Dallas, Tex.

A PUBLIC utility privately owned and operated is, primarily, an ordinary manufacturing concern, a distributing concern or, more commonly, a combination of both. Considered only to this point, it is in no way different from any other private enterprise, and, were there no other differences analogy as to valuations of the utility and as to the prices of goods handled, product manufactured and distributed or service performed might continue to the end with great simplification of some of the accounting, statistical and financial problems of the present-day utility. There are, however, further differences of vital import, some of which do not seem to be clearly recognized or at least fully appreciated.

Utility Cannot Operate as It Wills

One of the most important differences between the utility and the private enterprise is that the conduct of the business of the latter, as long as it infracts no law or ordinance relating to that business, is a matter that affects only the owners thereof, whereas the conduct of the affairs of the utility is one in which the public is directly and strongly interested. If the owners of the private business choose to let their property or goods or service "depreciate," if their product or service deteriorates in quality or supply, if their delivery of it is irregular, uncertain or otherwise unsatisfactory to their customers, that state of affairs concerns only themselves. The attitude of the public can be only a passive one. The customers, actual or prospective, can refuse to patronize the business; they can buy of a competing concern; they can use a substitute or they can go without the product or service—but they have no legal recourse.

Such a course cannot be pursued by the public utility, and the reasons for this are three. In the first place, in almost all cases, the utility has been allowed by the public to have a monopoly of the manufacture or supply, or both, of its particular product or service. Secondly, the utility is allowed certain powers not legally permitted to the private concern, and it is also permitted to use in its business certain public facilities and property which are not open to the use of the private business. Thirdly, as a compensation to the community for such public privileges, the utility agrees, either directly or by implication, or both, to give the community a "100 per cent service," local conditions or limitations fixing the "par value" of this service.

Keeping Local Service at Par

While comparison between the minor details of the service given in separate communities would be inequitable and nearly useless in the fixation of a 100 per cent local service in any one community, there have been developed in the past certain broad standards of service which can be applied in any community and to every public utility. There is, of course, a theoretically perfect service, but this is an ideal toward which all public utilities may strive but few attain. The agreement, however, between the utility and its public always implies in each local case that the public is to have 100 per cent value for the prices, or "rates," which it pays, and it equally implies that, when the public demands a higher standard of service, and this compels more investment of capital or increased operating expenses, the "reasonable return" of the owners of the utility shall not be diminished thereby. In other words, if the public demands "extras," outside of the original contract, it must pay the cost of those extras.

To have a continuity of such "par" service the utility must keep its whole property at the point where it is continuously capable of giving that standard of service—in other words, the utility must "maintain" its property at the local 100 per cent service point. In doing this, it will be compelled, in the course of time, to "use up" certain parts of the property. If these used-up portions are not replaced in proper time, form or quality, the ability of the property as a whole to give a par service is affected and the utility is not fulfilling its contract. It does not make any difference as to whether the using up of the various portions of the property is every minute, every hour, every day, or at much longer periods. Because a ton of coal is used up every fifteen minutes while the boiler into which it is fed lasts fifteen years makes no difference. That the physical properties of the coal compel it to be "replaced" or "renewed" every fifteen minutes, while those of the boiler necessitate only one half-millionth as early replacement or renewal, in nowise requires these two component portions of the property to be treated in a radically different manner in the accounting, financing or statistics of the utility.

"Depreciation" Leads to Hair-Splitting

It is customary to speak of certain portions of a public utility as "supplies," to divide its daily operating expenses into "labor and materials," to call the using up of certain portions of the property "repairs and renewals," and to call a similar using up of certain other portions of the property "depreciation." These are necessary nomenclature in the operation of the property and are designed for the information of the owners or operators, for comparisons as to economy and efficiency, for ease or simplicity of record, etc., but they must not be construed into definite classifications to be used for other and improper purposes. It is eminently proper and useful to differentiate between those portions of the property which are used up almost instantly, those which are used up within longer and arbitrarily fixed periods, and those which are used up in a virtually unknown and unfixable period, but such differentiation must be limited to the needs of operation and not made factors in financial, statistical or commercial relations between the utility and its public.

This diversion of arbitrary factors of operation into public matters in which they have no bearing has caused most of the disputes and hair-splitting on the subjects of valuation, rates and reasonable return, and the most aberrant factor of these disputes has been depreciation. It is conceivable that, in the valuation of a utility property for sale or lease to private parties, for sale to the community, or for purposes of taxation or condemnation, the item of depreciation might have a place and, under certain conditions, a very important place. In the valuation of such property, however, to determine the rates or the reasonable return, the farther any mention of depreciation can be kept from the subject the easier and simpler it will be to adjust, and the more correct and equitable will be the adjustment. In the valuation of a public utility property for any purpose other than for rate-making, the property is considered as in "a state of being." It is only when such valuation is for the purpose of rate-making (which includes that of profit-making) that the property is considered as in "a state of action." This is a vital distinction, for there cannot be such a thing as depreciation in an active body compelled to have and maintain a 100 per cent efficiency and service.

HANDLING ABNORMAL MAINTENANCE CHARGES

As it is at the demand of the public that the original contract for its par service was made, as it is the public only which demands the continuity of that service, and as it is the public demand which increases the standard of the local par service, it is the public which must pay all legitimate costs of maintaining that service at par. In equity, the public should pay no more than this, plus, of course, the reasonable return to the owners of the property for the use of the capital legitimately invested in it for the purposes stated. At this point, however, an accounting difficulty arises which has been largely—and in the main unnecessarily—the cause of the hair-splitting that has given to depreciation a place where it does not belong and an importance of which it is not worthy. This difficulty is caused by the fact that the replacements or renewals of the various portions of the property as they are used up come at very irregular intervals and in very irregular amounts of costs, often such as show "red ink" in the periodical statements. The rates cannot, in a public utility, be varied so as instantly to liquidate these abnormal amounts. It is publicly felt and practiced that—outside of a reduction of rates—the public should have, for as long a time in the future as is commercially possible, the assurance of stable rates, and that any rearrangement of them should come at long and, if possible, prearranged periods.

There comes, therefore, a financial inequity between the operating accounting and the selling accounting which should be adjusted in some manner that would be just to both utility and public. It is not just that the utility should be compelled to make large expenditures for the maintenance of the service at par or at a raised standard and not be immediately compensated for the abnormal, as it is for the normal, maintenance expense. Nor would it be just if the public were compelled to prepay such expense and not be compensated for that prepayment. The truly equitable method would be for the utility to pro-rate these abnormal maintenance costs among the customers each time it renders them their bills, but public policy is opposed to this method of procedure. Under these conditions the only other legitimate methods are for the utility to let these abnormal items, with interest, accrue in a memorandum account until there is an opportunity presented to render their total in the form of advanced rates as a bill to the public, or to absorb them by maintenance costs below the normal or by new economies and efficiencies.

ABUSE OF DEPRECIATION FUNDS

It is to be regretted that in the endeavor to solve this problem there has been injected many extraneous and unnecessary matters. Outside of the unnecessary use of subtle distinctions of no possible aid in its solution lies the fact that the very intricacy of the problem has led many utility owners further to cloud the matter for their own benefit—after the habit of the cuttlefish. In nothing has this been shown more plainly than in the use and abuse of the term "depreciation." In many cases the endeavor of the utility owner has been to make of this item an appreciation of the securities of the utility, an insurance that the value of the property should remain at par under all conditions of future operation. Granted that it is proper accounting to keep a fund to take care of the compelled deferred maintenance, erroneously termed "depreciation," that fund is a trust fund for a single specific purpose—the preservation and conservation of a 100 per cent service, the carrying out of the contractual obligations, both specific and implied. Any such fund actually paid in as it accrues has been collected from the public through the rates, and any diversion or attempt at diversion of such a fund from its legitimate use, especially a diversion of it for the purpose of protecting the utility owners from ultimate diminution of the value of the securities behind the property, is a palpable breach of trust. The public is coming, in a hazy way, to understand this point and to resent a misuse of depreciation funds.

PUBLIC SHOULD PAY FOR RAISING SERVICE STANDARD

Depreciation in an active organization is compelled deferred maintenance due to the varying life and characteristics of the multifarious parts that constitute the complex organization, and the necessity and amount of that maintenance is gaged in every community by its standard of 100 per cent service. It matters not to the public as to the operative means by which that standard must be obtained and retained, for that is a portion of the duties and risks which the owners assumed in their contract. The only interest of the public is that the contractual obligations of the utility be carried out to their legal termination as originally set or as extended. If the public, however, raises its standard of 100 per cent service, it alone must foot the bill for so doing. This is a point that has not been urged on the public until recently, and one which will take a large quantity of honest and straightforward logic and a long period of time to convince it. The fault of this lack of present conviction is largely that of the utility owner and operator, who have been so intent on the idea of making depreciation appreciate the securities underlying the properties that the public has come to the conclusion that a public utility property privately owned and operated is less an operative venture than a speculative one. This opinion of the public has been strengthened by the disagreement of the "doctors" called into dispute, no two of which seem to agree in even the nomenclature coined along with the arguments. And a further stiffening of this opinion has been caused by the fact that every endeavor of many utility owners has so often been directed more towards their financial obligations to themselves than to their contractual obligations to the public.

A SIMPLE METHOD OF RATE-MAKING

The proper and legitimate treatment of depreciation leads naturally to an equally legitimate, simple and equitable method of valuation for rate-making purposes —or what is the same thing in effect, valuation for profit-limiting purposes. No "expert" is needed in this matter to show his dexterity in hair-splitting, for the capital legitimately invested in the inception and the continued actual performance of the contractual obligation are matters of exact determination. To sum up, therefore:

A community desires a certain standard of utility service for which it agrees to pay. That is its 100 per cent service.

To achieve that standard from the inception of the enterprise, the utility has legitimately had to invest so much capital. That is the value on which its reasonable return will be computed.

To maintain that standard the utility will have to expend a certain amount per period (month, year or term of years). That, plus the reasonable return on the investment, constitutes the rates, which are the reimbursement by the public of the expense of its demand, plus a bonus, reward or return for the use of the private capital and the superintendence.

Or, expressed as an equation, the relationship may be shown thus: Interest on cost of achievement of 100 per cent service + cost of maintenance of same = rates.

American Association News

Committee Subject Assignments for the Engineering and Transportation & Traffic Associations Are Announced This Week—Mid-Year Dinner and Conference Will Be Held in Boston on Feb. 16—Ex-Senator Wakelee Gave Forceful Address on Public Relations in Newark, N. J., on Nov. 16

Midwinter Conference and Dinner Postponed to Feb. 16

On account of a conflict of dates between the Boston American Association dinner, announced for Feb. 2, and a meeting of the Chamber of Commerce of the United States, the midwinter conference and dinner will be held on Friday, Feb. 16. The names of the members of the committees in charge of this meeting were announced in last week's issue of the ELECTRIC RAILWAY JOURNAL, page 1023.

Public Service Section Discusses Public Relations and High Prices

The regular meeting of company section No. 2 was held in the beautiful auditorium of the new terminal in Newark, N. J., on Thursday, Nov. 16.

Aside from the usual business and entertainment features the program was in two parts, one devoted to public relations and the other to high prices of materials and labor. The speaker on the first topic was ex-Senator Edmund W. Wakelee, associate general solicitor of the company, and J. A. Pearson, purchasing agent of the company with headquarters in Philadelphia, Pa., led a discussion on "Effect of the European War on Market Prices and Deliveries of Railway Materials." Mr. Pearson was followed by George J. Newton, local purchasing agent, and General Manager R. E. Danforth, who discussed the general subject, and by F. L. Foulks, H. H. George, P. F. Maguire and A. Scheer, Jr., who presented the viewpoints of the distribution, engineering, maintenance of way and mechanical departments respectively.

Mr. Wakelee's address was a masterly discussion of the fundamentals of the subject and it will be abstracted in a later issue of the ELECTRIC RAILWAY JOURNAL. Mr. Pearson gave an intimate picture of the trying conditions in his department and explained why prices were high and deliveries slow. He urged the early placing of requisitions for next year's supplies and stated that orders involving special designs and specifications are not relished by manufacturers. Standard parts are comparatively easy to procure. He traced briefly the history of the rise in prices which lagged a year behind the beginning of the war. Quoting many price increases he testified that never in his career as purchasing agent had he seen anything like the present condition. He predicted an improvement following the close of the war due to the expected foreign competition and to the low tariff.

Each of the departmental speakers showed how the special supplies of his department have appreciated in price, the statements of all agreeing as to embarrassment due to slow deliveries. Incidents were quoted to illustrate this condition, which was seen to ramify into all phases of railway work even to lead pencils, paper clips and stationery. Mr. Danforth impressed upon the audience the urgency of using the smallest possible quantities of supplies consistent with first-class maintenance, showing how every man, including the platform man, can assist both to save supplies and increase traffic.

Secretary F. J. Davis read a list of thirty-nine applications principally from men in the transportation department, in large part the result of the campaign for new members which closes Dec. 15. A prize of $20 will be awarded to the most successful contestant, the award to be announced at the annual smoker on Dec. 21. President A. T. Warner announced that $50 will be awarded by the company to the member of the section who will win the medal to be awarded by the American Association for the best paper delivered before a company section this year. The monthly awards of $5 each in the suggestion contest for the September and October suggestions were also made. The entertainment of the evening consisted of musical selections played upon a Victrola demonstrated by a representative of a local music house.

Meeting of the Washington R. & E. Company Section

A meeting of company section No. 4 was held on Nov. 13 with President J. T. Moffett in the chair. Prof. C. J. Blanchard of the government service delivered an illustrated lecture on the most recent activities of the Reclamation Service. His talk was confined to electric power development of this important branch of the government, and was illustrated by moving pictures that had not previously been publicly displayed. Vocal and instrumental selections and a buffet luncheon were also features of the program.

A resolution was passed indorsing the local celebration of America's Electrical Week, Dec. 2 to 9, and a committee consisting of William L. Clarke, W. F. Dement, L. B. Schloss, G. S. Kimball and R. A. Vetter was appointed to co-operate with the general committee having the celebration in charge. It was agreed that the company section should enter a motor-driven electrically decorated vehicle in the automobile parade which will be a part of the celebration.

Committee Subject Assignments for 1916-1917

ENGINEERING ASSOCIATION

Buildings and Structures

1. Review of existing standards and recommendations with a view to the refinement of detail and the elimination of extraneous matter.

2. Further study of the subject of fences, with particular reference to concrete posts and method of casting the same.

3. Design of carhouse inspection pits.

4. Advise committee on way matters of the approval or rejection of all or any portion of the conventional symbols for recording surveys.

5. Advise committee on way matters of the approval or rejection of all or any portion of its study on wood preservation.

Equipment

1. (As above.)

2. Development of check gages and templates, such as:
   (a) Gaging points and terms for wheel and track.
   (b) Wheel mounting and check gage.
   (c) Brake-beam gage, covering spacing of brakeheads.
   (d) Wheel flange and tread contour gage for new wheels.
   (e) Standard wheel tape.
   (f) Plane gage for solid steel wheels.
   (g) Rotundity gage for solid steel wheels.
   (h) Journal bearing and wedge gages.

3. Compilation of data bearing on development of standards for railway motor parts:
   (a) Carbon brushes.
   (b) Bearings.
   (c) Gear cases.
   (d) Bolts.
   (e) Pinions.
   (f) Gears.
   (g) Motor wires.
   (h) Commutators.

4. Advise committee on way matters of the approval or rejection of all or any portion of its study on wood preservation.

5. Consider jointly with the committee on way matters the "use of a curved head for girder rails and specific reference to wheel and track wear."

6. Consider wheel and railhead contours jointly with committee on way matters.

Heavy Electric Traction

1. (As above.)

2. Revision of diagram of location and clearance of overhead conductors, with the suggestion that the height of the hand-brake staff be indicated; and that the height of the car running board be dimensioned on the diagram in cases Nos. 4 and 5 (Engineering Manual, Ds 6a). This subject before final reporting to have the approval of the committee on power distribution.

3. Advise committee on way matters of the approval or rejection of all or any portion of the conventional symbols for recording surveys.

4. Revise dimensions on standard diagram of location and clearance of overhead conductors and include provisions for pantograph clearance.

5. Advise committee on power distribution of approval or rejection of specification for catenary overhead trolley construction to cover high voltage as well as 600-volt d.c. service.

Power Distribution

1. (As above.)

2. Advise committee on heavy electric traction of approval or rejection of the revision of the diagram of location and clearance of overhead conductors, to show the height of the hand-brake staff as well as the height of the car running board in cases Nos. 4 and 5 (Engineering Manual, Ds 6a).

3. Further study of specification for overhead line materials.

4. Specification for metal crossarms and fittings.

5. Development of a specification for catenary overhead trolley construction to cover high voltage as well as 600-volt d.c. service; any specification prepared to have the approval of the committee on heavy electric traction.

6. Advise the committee on way matters of approval or rejection of all or any portion of the conventional symbols for recording surveys.

7. Advise the committee on way matters of approval or rejection of all or any portion of its study on wood preservation.

Power Generation

1 (As above.)

2. Further consideration of operating performances of railway power stations.

3. Report on the development of automatic substations.

4. Historical review of the development of large turbine units.

Way Matters

1. (As above.)

2. Specification for special work with particular reference to steam railroad crossings.

3. Development of a spiral for use in the design of switches, mates and frogs.

4. Development of conventional symbols for recording surveys. Such symbols as the committee may recommend shall be submitted to the committee on buildings and structures, the committee on power distribution, the committee on heavy electric traction and the committee on block signals for their approval before presentation.

5. Further study of the subject of wood preservation, including specifications for preservative. This subject to bear the approval of the committee on power distribution, the committee on buildings and structures and the committee on equipment.

6. Report on the development of hand and power tools for track construction.

7. Complete the design for "drilling of joint plates and their application."

8. Report on the "use of a curved head for girder rails" with specific reference to wheel and track wear. This to be considered jointly with the committee on equipment.

9. Consider wheel and railhead contours jointly with the committee on equipment.

Special Committee to Consider Revision of Standard Stranding Table

1. Make a final report as to when the table for stranding of apparatus cables is to be adopted.

TRANSPORTATION AND TRAFFIC ASSOCIATION

Fares and Transfers

1. Co-ordinate work of previous committees, according to topics the dates being essential but secondary to the main division, which should be by subjects. Attention is called to the method employed by the 1916 committee on construction of schedules and time-tables.

2. Further study of the use of ordinary type cars as prepayment cars without fare boxes.

3. Study of the use of prepayment cars on routes having more than one fare zone.

Passenger Traffic

1. (As above.)

2. Investigation of established traffic departments for promotion of new business, together with results and opinions.

3. Study of plan whereby charges can be made for carrying baggage. This to be worked out jointly with a committee representing steam railroads.

Rules

1. Necessary revision of city and interurban codes.

2. Block signal rules to be studied jointly with the joint committee on block signal rules of the American Railway Association and the Railway Signal Association.

Schedules and Time-tables

1. Dispatching on urban lines, latest practices and recommendations.

2. Statement of the factors essential in the making of all time-tables and establishment of uniform basis for determining and stating schedule speed.

3. Further investigation of "skip-stop" operation, with recommendations as to proper method. (To be handled as a paper.)

4. Street railway transportation in congested districts. (To be handled as a paper.)

Training of Transportation Employees

1. (See No. 1, committee on fares and transfers.)

2. Consideration of methods that have been employed by various companies in teaching employees the rules of proper service.

3. Employment specifications.

JOINT COMMITTEES

Block Signals

ENGINEERING ASSOCIATION SUBJECTS

1. Review of existing standards and recommendations with a view to refinement of detail and elimination of extraneous matter, with particular reference to:
   (a) Requisites of installations for automatic block signal systems on high-speed interurban railways.
   (b) Use of continuous track circuits for the control of automatic signals for high-speed interurban service (Engineering Manual, Ss 7b).

2. Block signal rules, to be studied jointly with the Transportation & Traffic Association committee on rules, the Railway Signal Association and the American Railway Association.

3. Further study of block signal operations on roads signaled from end to end, covering maintenance cost, efficiency of operation and effect on traffic.

4. Advise committee on way matters of approval or rejection of all or any portion of the conventional symbols for recording surveys.

TRANSPORTATION & TRAFFIC ASSOCIATION SUBJECTS

1. (See No. 1, committee on fares and transfers.)
2. (See No. 2 above.)
3. (See No. 3 above.)

On Claims-Transportation

TRANSPORTATION & TRAFFIC ASSOCIATION SUBJECTS

1. Results obtained by co-operation of transportation and claim departments in a general reduction of all classes of accidents, together with form of reports made and submitted by one department to the other.

2. Investigation of methods used, if any, by both claims and transportation departments in safety campaigns wherein the public is concerned.

3. Safety advertising on cars.

CLAIMS ASSOCIATION SUBJECTS

Not yet assigned.

Engineering-Accounting

ENGINEERING ASSOCIATION SUBJECTS

1. Interdepartmental charges. (See recommendations of 1914 committee for work to be assigned to ensuing committee, 1914 Engineering Proceedings, page 378.)

2. Further study of the development of a property ledger (as started by the 1916 committee) looking toward the maintenance of a continuous inventory. This subject to be considered as applying to the entire physical property.

ACCOUNTANTS' ASSOCIATION SUBJECTS

Not yet assigned.

Transportation-Accounting

TRANSPORTATION & TRAFFIC ASSOCIATION SUBJECTS

1. Determination of formula to show the cost per annum for hauling 1 lb. or 1 ton car weight.

2. Continue the following subjects, assigned the 1916 committee on transportation-accounting:
   (a) Investigation of cost of handling baggage free, to determine whether the cost of handling this baggage wipes out the profit resulting from the fare received.
   (b) Investigation of subdivision of power cost among construction, maintenance and operation.

3. Forms of graphic presentation of transportation data and statistics.

ACCOUNTANTS' ASSOCIATION SUBJECTS

Not yet assigned.

Transportation-Engineering

TRANSPORTATION & TRAFFIC ASSOCIATION SUBJECTS

1. Further investigation of the operation of trail cars in high-speed interurban service; to include the relative merits of trail vs. motor cars.

2. Effect of car and equipment design on duration of stops for both passenger and freight service. Car design to be studied from a traffic standpoint in all its phases, first standardizing the method of determining results, having identical formulas and practice for obtaining observation and data from which conclusions are drawn. Investigation to include specimen data sheet showing information which should be obtained in order that member companies who desire to follow the recommendations may have full information before them.

3. Study of electric current saving devices, including summary showing results obtained, together with costs, including maintenance. (To be treated as a paper).

ENGINEERING ASSOCIATION SUBJECTS

Same as above.

COMMUNICATIONS

Name for One-Man Cars

OAKLAND, CAL., Nov. 7, 1916.

To the Editors:

I saw in a recent issue an editorial request for a good name for one-man cars. I suggest the name "mono-man" cars and "bi-man" cars to distinguish between one- and two-man cars. The terms mono- and bi- are used in a great many every-day expressions.

FRANK L. TRATHEN.

CLEVELAND, OHIO, Nov. 10, 1916.

To the Editors:

Some time ago I noticed an editorial in the JOURNAL requesting suggestions for a better name for the so-called "one-man car."

A car that requires only one man to operate it, of course, reduces the operating expenses; so it is a benefit to the railway companies. A railway company whose operating expenses are reduced can afford to give better service, and this is of benefit to the public.

Therefore, I suggest "Mutual Benefit" as a name for such cars. "Mutual Benefit," no doubt, would soon become, paradoxically, "Double Ben"; and, some of the operatives would cut the name to "Ben" or "Bennie."

LOUIS P. LIPPS.

Some Recent Advances in

EQUIPMENT AND ITS MAINTENANCE

Welding High-Speed Tips on Lathe and Planer Tools Cuts Cost—Boston Elevated's Pressure Timber Treating Plant is Now in Full Operation—Connecticut Company Makes Center-Entrance Cars from Single-Truck Ones—Old Hoes Can Be Used in Making Squeegees for Grouting

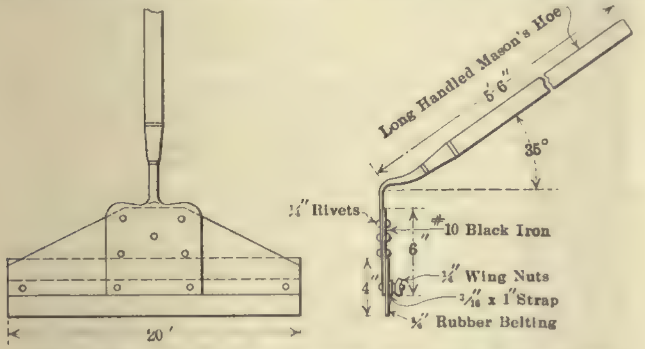
(*Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.*)

Grouting Squeegee Made from Old Hoe

Author Explains Why Brooming Cement Grout Joint Filler Is Not Satisfactory

BY R. C. CRAM
Assistant Engineer Way and Structure Department Brooklyn Rapid Transit System

The application of cement grout joint filler in granite block pavements has always required careful attention to detail. The last or finishing coat is undoubtedly the most important and the usual method of applying it by brooming a comparatively thick mixture into the joints has generally been accompanied by the spreading of a coat of grout from ⅛ in. to ¼ in. thick over the whole surface of the pavement. Attempts to leave the surface of the blocks practically free from mortar and still keep the joints full of grout generally meet with failure where brooms are used, as the bristles pick the grout out of the joints unless a thick mixture and fairly heavy coat are applied with a broom having quite soft bristles.



SQUEEGEE FOR USE IN CEMENT GROUTING OF GRANITE BLOCK PAVEMENT

The heavy coat on the surface is somewhat wasteful of material, but greater objections to it result from the rather slow reduction of the coating to dust and the action of toe calks on horses' shoes in picking of the grout in such a way as to cause its removal from the tops of the joints. With grout so removed the corners of the block are unprotected and they wear round very rapidly.

Similar troubles have not usually been experienced with grouted brick pavements and the now prevailing practice of using squeegees for applying the finishing coat in grouting brick, combined with the comparatively smooth finish of modern granite blocks, has led to the use of the squeegee for final grouting work on granite pavements also.

The results obtained experimentally by this company last year with the squeegee in track pavements have warranted its adoption as a part of the tool equipment of every track gang, which is also equipped for pavement work. The illustration gives the details of such a tool, which is being used to advantage in Brooklyn. Its manufacture is simple and the use of old, badly worn hoe blades effects some salvage. In passing it may be noted that the Borough of Brooklyn now requires the use of a squeegee for grouting work in new granite pavement where cement grouted joints are specified.

Boston Elevated Completes Pressure Wood Preserving Plant

In the First Pressure Plant Installed on an Electric Railway This Company Can Treat 7,000,000 Feet of Timber Per Year

BY EDGAR W. BRIGHT
Tie and Timber Agent, Boston Elevated Railway

The Boston (Mass.) Elevated Railway has recently completed a timber treating plant at the company's South Boston yard which is the first pressure installation to be built by any street railway in the United States, and which embodies a number of interesting features in design in comparison with ordinary practice. This was referred to in the writer's article published in the issue of the ELECTRIC RAILWAY JOURNAL for March 11, 1916, page 504. The company has used creosoted ties and lumber extensively during the past five years, and for some time the lumber problem of the road has been in charge of the writer, under whose direction the plant has been established. The designing engineer is Grant B. Shipley, of Pittsburgh, Pa., whose patents are embodied in the plans and specifications for the work. The plant is adapted to treatment by either

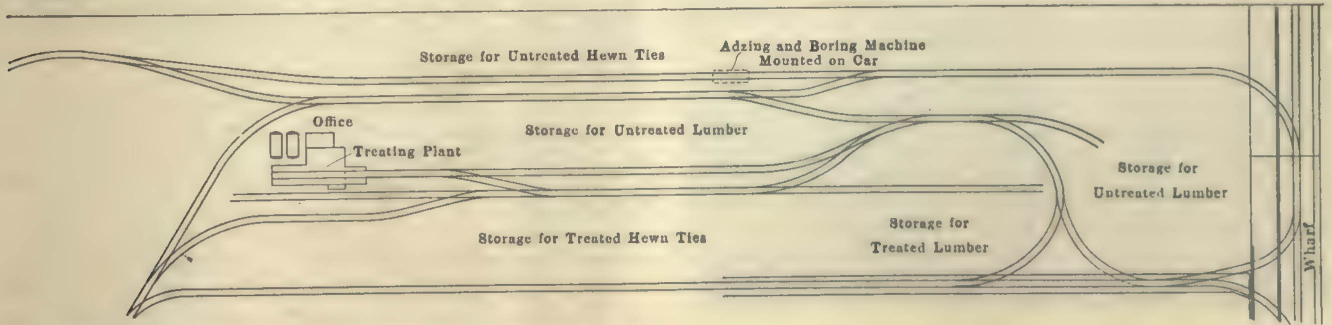

Storage for Untreated Hewn Ties
Adzing and Boring Machine Mounted on Car
Office
Treating Plant
Storage for Untreated Lumber
Storage for Untreated Lumber
Storage for Treated Hewn Ties
Storage for Treated Lumber
Wharf

FIG. 1—GENERAL LAYOUT OF TIMBER TREATING PLANT SHOWING RAIL AND WATER TRANSPORTATION FACILITIES

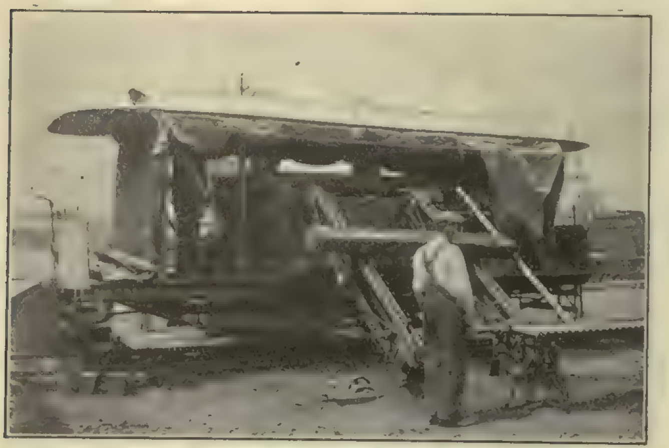


FIG. 2—ADZING AND BORING MACHINE, CAPACITY TWELVE TIES PER MINUTE

the full-cell or the Rueping process. It represents an investment of about $30,000, and has a capacity when operating two charges per day in nine hours of about 210,000 ties of 7,000,000 ft. B. M. per year using air-seasoned timber and treating by the Rueping process.

The location of the plant in the company's general yard affords opportunity for convenient distribution of treated material from a central point and enables shipments to be received by water. Timber is brought to the yard in vessels, as the property fronts on Boston Harbor, and after being unloaded on the wharf indicated in Fig. 1, it is distributed for air-drying by trucks and service cars running on loop and other tracks feeding the storage areas shown. Before treatment ties are adzed and bored on a Greenlee adzing and boring machine (Fig. 2) with a capacity of twelve ties per minute, this machine being mounted on a car and thus being available for service on any track in the yard. Most of the material treated is long-leaf yellow pine. The equipment also includes a timber gainer, which is used in dapping guard timber used on elevated structures and elsewhere.

The treating plant is located near the south end of the property and is mounted on a solid concrete foundation. A general view of the structure is shown in Fig. 3. The installation consists of two storage tanks, a treating cylinder capable of handling lumber up to 50 ft. in length, a pressure tank mounted on scales, vacuum pump and compressor equipment and other apparatus, together with an unusually flexible piping system. All of the principal equipment except the storage tanks is installed in a cylinder house shown in plan in Fig. 4, and in cross-section and elevation in Figs. 5 and 6. The housing is of corrugated iron on steel framework.

FIG. 3—GENERAL VIEW OF PLANT

The plant is one of the few installations in the country in which a standard gage track is operated into the treating cylinder. It is far more flexible than the ordinary installation, besides being remarkably compact. Steam is supplied by a pipe line connecting directly with the company's South Boston generating station, and creosote is delivered to the storage tanks by automobile trucks, provision being made in the piping to empty the truck tanks by either 20-lb. air pressure or by vacuum. This enables the trucks to be completely emptied.

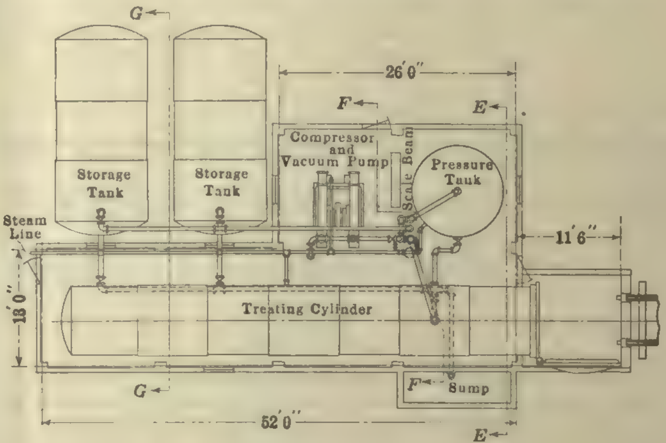
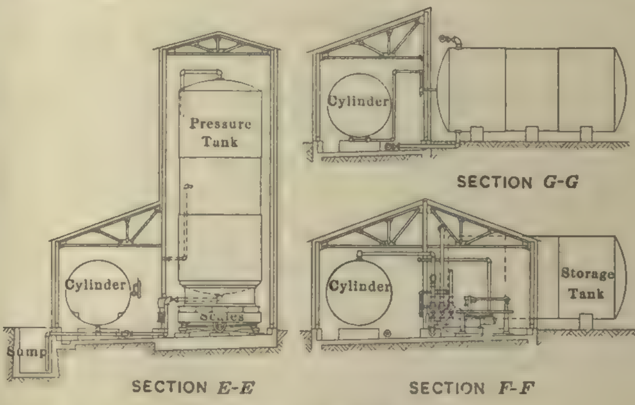


FIG. 4—PLAN OF CYLINDER HOUSE

The storage tanks are each 22 ft. 6 in. long by 9 ft. 9 in. in diameter, their capacity being about 13,000 gal. each. They are mounted on concrete saddles and are installed with horizontal axes at right angles to the longer axis of the cylinder house. The piping connections enable either tank to be utilized in serving the pressure tank, and live steam coils are installed in each to protect the creosote from freezing in the winter season. Provision is made for the drainage of these coils through a valve beneath each tank which is left slightly open when in service. Each tank is equipped with a safety valve and a stop valve controlling the delivery of oil to the interior of the establishment. Piping connections are also provided for the introduction of compressed air into the storage tanks to insure rapid delivery of oil to the plant, and throughout the plant the creosote is handled by air pressure. The shells of the storage tank are of 3/8-in. flanged steel, the heads being of 1/2-in. steel. An 11-in. x 15-in. manhole is provided at each head end.



SECTION *G-G*

SECTION *E-E*

SECTION *F-F*

For section lines see Fig. 4.

FIG. 5—CROSS-SECTIONS OF CYLINDER HOUSE

Two compressors are in use, both being steam-driven. Nearest the storage tanks is an Ingersoll-Rand "Imperial" type XI horizontal high-duty duplex compressor and air pump, with 7-in. x 7-in. x 10-in. cylinders, mechanical inlet valves and flywheel. This is supplemented in high-pressure work by a Westinghouse air compressor capable of handling 29 cu. ft. of air per minute at 80 lb. pressure and delivering it at 200 lb. pressure when operated on a steam line pressure of 135 lb. per square inch. The piping enables the two compressors to be connected in series through valve manipulation.

The working pressure tank, 9 ft. 9 in. in diameter and 22 ft. 6 in. high, is mounted in the cylinder house on a Howe tank scale of the registering beam type, with 10-ft. x 10-ft. supports and graduations reading in 10-lb. steps. The scales are designed to carry a tank of 38,000 lb. steady load, and 120,000 lb. variable load of creosote, a total capacity of nearly 160,000 lb. The working pressure tank is equipped with steam coils for maintaining the proper oil temperature. Its shell is of flanged steel plate 1-in. thick, the tank being designed to withstand a working pressure of 175 lb. per square inch, and a hydrostatic test of 265 lb. Ball-and-socket joints are installed in the air and oil mains leading into the tank, to care for the movement of the latter upon the scales as the creosote volume is changed.

The creosoting cylinder or retort is 7 ft. 6 in. inside diameter and 51 ft. 2⅜ in. long. It has a shell of ¾-in. flanged steel made in seven courses or rings of one plate each. It is mounted on iron saddles resting on reinforced concrete foundations. The door, details of which are shown in Fig. 7, is located at the forward end. This has a steel frame of angle section bored accurately to fit the shell. The outer face of the frame is turned and grooved for a gasket. Fitting the frame and hinged to it is a heavy cast-steel door frame, to which is double-riveted a dished head of flanged steel, designed for a working pressure of 175 lb. and a test pressure of 265 lb. per square inch. The door is carried on two hinges supported by ball-thrust collar bearings. It is fastened by forty 2¼-in. T-head hinged bolts, each equipped with a steel washer and hexagonal nut. The door gaskets are of No. 600 "Ankorite" H. P. asbestos. The cylinder track consists of 4-in. x 4-in. x ¾-in. angles supported by six pressed-steel brackets per course. Fig. 8 shows a charge ready for insertion into the retort, the timber being mounted on special bolster trucks equipped with locking hoops. These hold about 10,000 ft. B. M. per charge, and tie cars hold about 420 ties per charge. The trucks are pushed into the retort by a service car equipped with an extra heavy bumper and loaded with discarded tie plates to provide the necessary traction. Charges are withdrawn from the retort by the same car through a wire cable attachment. The rail sections in front of the retort are pushed back on short pipe rollers to facilitate handling when the door is to be closed. Twelve steel tie cars are also in service around the yard.

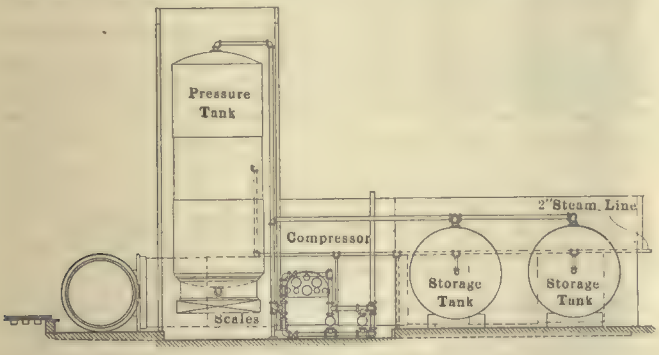


FIG. 6—LONGITUDINAL SECTION OF CYLINDER HOUSE

The full-cell process consists of impregnating the fibers and cells of the timber with from 5 lb. to 20 lb. of oil per cubic foot. In this operation the wood is either air-seasoned or steamed in the cylinder, sometimes both. This is done to reduce moisture and expel sap; then a vacuum is produced and maintained until the preservative is introduced and the wood is completely submerged. The pressure is then increased from 100 lb. to 150 lb. per square inch and maintained until the desired penetration has taken place, when the remaining oil is drained from the cylinder. Sometimes a vacuum is produced and maintained at the finish to drain the surplus oil from the outside surface of the wood to prevent loss of oil after the material is removed from the retort.

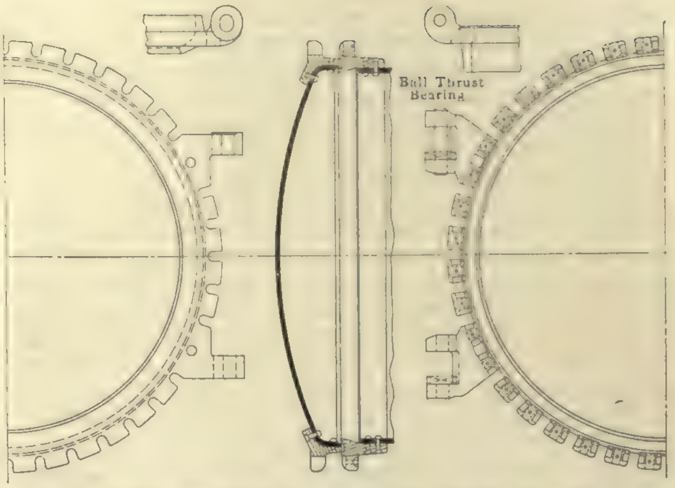


FIG. 7—DETAILS OF CREOSOTING CYLINDER DOOR

The Rueping or "partial cell" process consists of forcing compressed air into the pores of the wood; without releasing this air pressure, the oil is permitted to flow into the cylinder and air is displaced and forced into the top of the working pressure tank. After the wood is completely covered with preservative, the latter is then forced into the wood to the required amount. The air pressure is then released and the preservative is drained from the cylinder. A vacuum is then produced which causes the air within the cells to expand and force fluid out of the wood, leaving from 4 lb. to 6 lb. per cubic foot. About 20 lb. maximum of air suffices to force oil from the storage tanks into the pressure tank. At the beginning of a run about 118,000 lb. of oil is in the working pressure tank. The oil temperature is usually about 170 deg. Fahr. before entering the retort. Steam coils are provided in the retort as well as in the other tanks above noted, and beneath the retort a sump about 9 ft. deep has been built to receive drained oil from the interior of the tank. This oil can be reclaimed by utilizing one of the compressors

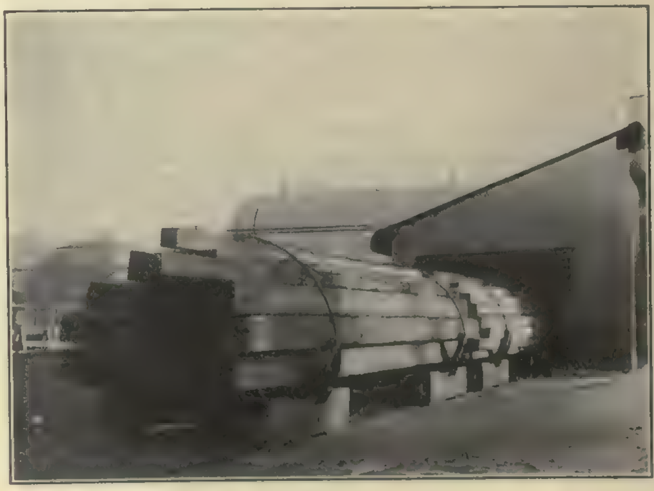


FIG. 8—CHARGE OF TIMBER READY FOR RETORT

as a vacuum pump; in fact, either pump may be operated on pressure or vacuum work, and the piping enables pressure or vacuum to be applied to either the retort or to the working pressure tank as desired. An extra discharge pipe with cracked valve is also provided in the retort to enable sap, water, etc., to be drained into a blind drain in case the full-cell process is in use. This enables the steam supply to be kept on the coils within the retort throughout any desired period. Before the introduction of oil in the Rueping process, air at 60 lb. pressure is admitted to the retort for about forty minutes, in order to open the cells for subsequent treatment. The amount of oil absorbed is obtained by scale readings instead of by the customary and less accurate system of weighted floats.

The operation of the plant requires the services of twelve negro timber handlers who load ties and lumber on cars; one yard foreman who has charge of loading material on cars for treatment and who also acts as timekeeper; and one engineer. The two last-mentioned report to the tie and timber agent of the company, who is directly responsible for the operation of the plant. The auxiliary equipment includes a full set of Foxboro indicating and recording pressure and vacuum gages, thermometers, etc., and Crosby pressure gages. A complete system of records is maintained on all work handled. The plant construction was begun in March of the present year, the first treatment being given in August.

Protecting Cables in Manholes from Explosion of Adjacent Cables

BY ALBERT F. HOVEY

Several methods of fireproofing cables in manholes against the explosion of adjacent cables have been developed by operating engineers. In one of the oldest and perhaps best known of these methods common rope and concrete are employed. The former is wound spirally around the cable with about 1 in. separation between the turns, and the cable and rope are then plastered with a one to one mixture of sand and cement. The rope provides a rough surface to which the concrete clings readily and gives a slightly flexible background, which aids somewhat in preventing cracking of the fireproofing under a chance blow.

The workmen's hands have proved to be better than any tool for applying the cement for this type of covering. As far as the fireproofing qualities alone are concerned, this covering is satisfactory, but its removal presents a formidable task. Efforts to reduce this difficulty have been made by placing the turns of rope closer together and, except for the fact that rope is now rather expensive, this scheme is considered fairly satisfactory.

Another method of fireproofing is that in which asbestos millboard, cut into 3-in. strips, is wound around the cable and held in place by a fireproof paste, silicate of soda. This covering proved satisfactory as long as the manholes remained dry, but if water ran in and covered the cables, the silicate was dissolved and the asbestos loosened, dropping from the cable. Recently, on account of the difficulty in obtaining deliveries of asbestos millboard, asbestos listing, a woven material with a selvage has been substituted. This material can be purchased in the form of 3-in. tape and wound spirally around the cable, and the silicate of soda covering is used to hold it in place.

When material as expensive as asbestos is used for fireproofing cables, some provision should be made for salvaging the covering when it is removed from the cable. A simple and inexpensive way of doing this is first to wrap the lead sheath of the cable with strips of cheesecloth dipped in paraffine. One layer of cheesecloth is sufficient. Then when repairs are necessary, the asbestos can be separated easily from the paraffined cloth and taken off in long strips. If these strips of asbestos are carefully rolled backward during removal, they can be preserved and re-applied.

In what is perhaps the most recent method of fireproofing underground cables, a layer of paraffined cheesecloth is wound around the sheath and over this metal lath, covered with cement and cut into strips, is spirally wound. The cloth is applied as described above, simply to aid in removing the covering. The metal lath used is a wire mesh covered with brick clay, put on under pressure and baked, the resultant product being a web of small briquettes which can be applied the same as any wire or expanded metal lath. This makes an excellent foundation for the cement mortar, as it is porous and flexible. The cement can be applied with a trowel or by hand, forming the covering into a homogeneous mass. While this type of covering is somewhat more difficult to install than the asbestos covering, it is considerably less expensive, as calculated from the prevailing prices of material. It can easily be removed by breaking the cement covering with a hammer and cutting the metal lath from the cable with a pair of tinner's snips.

Whatever covering is applied should be considered good insurance against both mechanical and electrical trouble. The added application of paraffined cheesecloth under any of these types of covering insures the lead sheath against damage at the time the covering is removed on account of any changes which are made to the cables in the manholes.

Motor Truck Service for Stores Department

The stores department of the Union Pacific Railroad recently installed motor truck service in connection with the operation of its Omaha store, the new equipment being a 2-ton gasoline truck, herewith illustrated, which was purchased from the McKeen Motor Car Company of Omaha, Neb.

MOTOR TRUCK USED IN STOREHOUSE SERVICE BY THE UNION PACIFIC RAILROAD

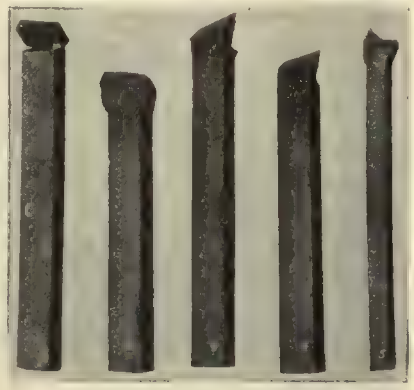
In initiating this factor in the material and supplies department it is believed that the Union Pacific is entitled to the distinction of pioneering the introduction of motor truck service in railroading.

The new service supersedes the former teaming transfer system for handling the company's material and supplies locally in Omaha and immediate vicinity. It is not understood that this line will use motor trucks for inter-city deliveries of its railroad stock, as this tonnage amounts to hundreds of cars per month and is distributed to the different points on the railroad by stores department steam locomotive special trains.

Welding Tool-Steel Tips to Machine-Steel Shanks

Abnormal Cost of High-Speed Steel Forces Economies in Its Use—Welding Can Be Applied Here with Profit

The constantly increasing price of high-speed tool steel now makes it almost prohibitive for the average shop to use cutting tools composed wholly of such material. Furthermore, with high-speed steel at present prices it is very costly for a shop to have to scrap worn-out tools. However, noticeable economies can be effected by welding high-speed steel tips to ordinary machine-steel shanks.



WELDING TIP ON LATHE TOOL

1—Tip "tacked" to shank.
2—Tool after welding.
3—Tool after first grinding.
4—Tool ready for use after tempering and finish grinding.
5—Tool tested for strength of weld by hammering.

Briefly, the process is as follows: The high-speed steel tip is first "tacked" to the machine-steel shank, and the whole is preheated. After fluxing with borax, welding is started. After welding, the tool is immediately laid in mica dust to cool gradually. It is then given a first grinding and is tempered, after which the finishing grinding is done and the tool is ready for use.

The accompanying illustration shows the several steps in the process. The tool numbered 5 was tested for strength of weld by hammering. It broke above the weld.

In tools made up by this process the reinforcing metal which is built out and around the tip serves both to give larger radiating surface and affords a large conducting path back to the butt of the tool, thus keeping down the temperature at the cutting edge. The machine-steel shank may be of any length desired, of cold or hot rolled, or carbon steel, while the high-speed steel tip should be short.

The above represents the practice of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., which is at the present time using cutting tools with high-speed steel tips and machine-steel shanks for many of its planers and lathes. This company has found the electric arc process of welding very satisfactory, and much cheaper than any other process. This conclusion has been reached after tests employing oxy-acetylene and forging methods. For best results the current for this work should be approximately 100 amp., and the voltage of the welding circuit 60 to 70. A 5/32-in. Norway iron electrode should be used. The work should not be hurried, but a good operator should be able to make between twenty-five and thirty welds on tools of 1½ in. cross-section in a day of nine and one-half hours.

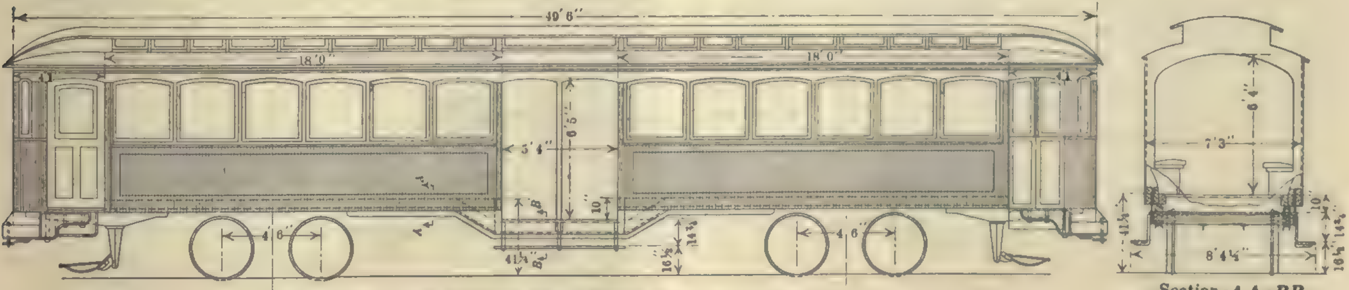
Rush-Hour Car Made of Two Single-Truck Units

Experiment Conducted by The Connecticut Company of New Haven to Determine Commercial Practicability of Plan

The Connecticut Company, like many other companies which have been engaged in electric railway operation for a long time, has a number of short single truck cars with old-fashioned platforms which have become obsolete owing to the progress in the art of car building. To determine whether it would be worth while to splice two of such cars to make one long center door car is a job that has just been completed at the New Haven shops of the company.

Each of the old cars used in the construction of this car were of the panel type, 18 ft. over corner posts and constructed with 4 in. x 6 in. wooden side sills. Additional sills of sufficient width to take the sheathing were bolted to the outside of the old sills making it a straight-sided car. The vestibules, platforms, and bulkheads were removed from one end, and the roofs extended to cover the well. A stirrup step at each end of the car provides access to the motorman's position in the front of the car on the left-hand side, but on the right-hand side a folding door and step is provided. The bracing under the center entrance consists of two 6 in. x 6 in. angles carried back 13 ft. from the center entrance on each side and attached to the old side sill. There are also two 4-in. channels attached to the bottom of the sills, and two 4-in. T-sections in the middle of the car. The channels and the T-sections are carried back 7 ft. on each side from the center door.

The center passageway is divided by an iron stanchion, 2 in. in diameter on which the fare box is mounted. Two folding doors manually operated are provided. The well in the center of the car is 5 ft. 4 in. measured longitudinally with the car and 6 ft. 8 in. measured transversely. This is nearly the same width as the car. The steps are stationary, the clearance conditions in New Haven permitting of this arrangement.



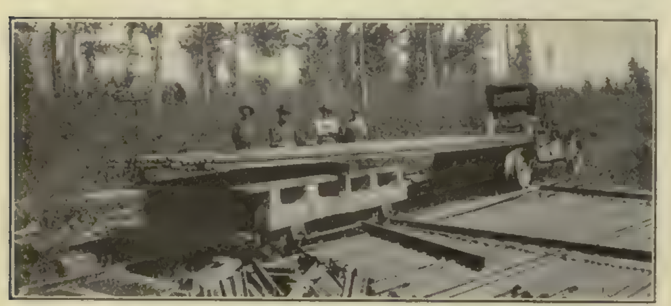
Section-*AA*-*BB*

THE CONNECTICUT COMPANY'S DOUBLE-TRUCK CAR MADE BY SPLICING TWO SINGLE-TRUCK UNITS

The seating capacity of each of the old cars was 26. while the new unit seats 52. The weight of the body without the trucks, trolley or other equipment is approximately 18,000 lb. The drawing shows the car mounted on 33-in. wheels, but it is now mounted on Standard 0-50 trucks with 30-in. wheels and four Westinghouse No. 512 motors. The heights of the two steps from the street to the well are 15 in. and 14¾ in. respectively. The height of the riser from the well to the floor of the car is 10 in. The cost of splicing the two old cars as described was about $1000.

Motor Trucks with Steel-Flanged Wheels

The accompanying photographs show an application of a motor truck in salvaging rails on an abandoned lumber and tie road on the Burlington system. This ran from Nahant, Mont., into the great forests of the Black Hills to the west. The motor truck was used instead of a steam locomotive because wood-burning locomotives, the only ones available, were debarred under the forest reserve laws, the track was in bad repair and there was a rank growth of grass over the track. A White 1½ to 2-ton truck was used and in the first month of service it covered about 3300 miles, averaging 108 miles a day. By the use of a flat car as a trailer it was able to haul 12 tons of rails into Nahant each trip. The truck made two round trips a day, climbing several grades as steep as 7 per cent on second and third gear, and registering an economy record of better than 10 miles to a gallon of gasoline. After depositing its load at Nahant the truck covered the 27 miles to the forests on fourth speed.


SALVAGING RAILS IN THE BLACK HILLS BY MEANS OF AUTO TRUCK EQUIPMENT

AUTO TRUCK EQUIPMENT WHICH OPERATED SUCCESSFULLY ON ABANDONED STEAM ROAD

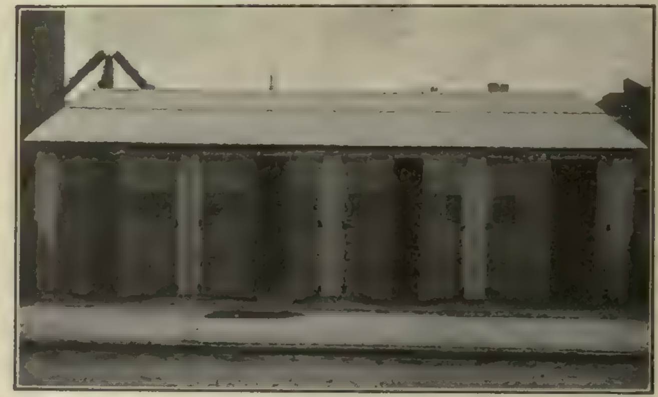
Oil Dripping from Ducts Gives Clue to Cable Troubles

A certain section of underground cable which extended over a hill had been a source of frequent trouble, and the cause of this was by accident and reasoning found out, it is believed. An engineer inspecting the cables in a manhole at the foot of the hill noticed oil dripping out of the ducts, which naturally caused him to speculate as to its source. The cable installed was of an old type in which an oily substance was used as part of the insulation. The company had previously had considerable trouble with electrolysis in this section, but this had been eliminated. The engineer believed that this old electrolytic action had probably made some holes in the cable sheath and, when the cable became hot under load and the oily insulation more fluid, that the oil flowed through the holes and drained down the hill to the manhole. This in time caused dry or weak spots in the cable insulation and consequent burn-outs, several of which had occurred in the section. Working on this theory the cable was replaced with dry paper-insulated cable and the trouble is thought to be eliminated, there having been no burn-outs in this section since, although the new cable has been in use several months.

Portable Garage for Subway Construction Work

The illustration herewith is of a portabe garage erected for the Rapid Transit Subway Construction Company, New York, N. Y., by the C. D. Pruden Company, Baltimore, Md. This structure was put up originally on Thirty-third Street, but has since been moved a number of times and is now located on the northeast corner of Thirtieth Street and First Avenue.

It is 28 ft. wide, 50 ft. long and 12 ft. high at the eaves. The framework consists entirely of structural steel, and the walls are of galvanized steel sheets with beaded edges, thus making the garage fireproof throughout. Four pairs of Kalemeined double doors, 10 ft. x 11 ft. 9 in. are provided, and in addition one single door and four wireglass skylights.


PORTABLE GARAGE USED IN SUBWAY CONSTRUCTION WORK IN NEW YORK CITY

It is claimed by the makers that one firm utilizing this type of portable garage for storage of motor trucks saved the price of the building in less than one year.

Home-Made Safety Bulletin Boards

A recent poster of the National Safety Council is devoted to the above topic. It states that one of the members has adopted a good-sized blackboard as the background of his bulletin board. He pastes his illustrations on the blackboard and then chalks in his text. His men recognize the personal effort he is making in their behalf and are carefully studying the new bulletin board. Another member accomplishes a very similar result with adhesive paper letters which he secures in bright colors as well as white. He, too, uses cut-outs for illustrations.

NEWS OF ELECTRIC RAILWAYS

Transportation and Traffic
Financial and Corporate **Personal Mention** **Construction News**

INDETERMINATE FRANCHISE FOR KEY SYSTEM

Charter Amendments Carry Three to One—Personal Appeal Methods of Education and Good Relations with the Public Prove Effective

At the recent election the resettlement franchise amendments in favor of the San Francisco-Oakland Terminal Railways, referred to previously in the ELECTRIC RAILWAY JOURNAL, were carried three to one. Now that the approval of the amendments has been secured, the matter will be placed before the State Legislature for ratification, after which the actual execution of the proposed resettlement franchise must again come before the people for approval. This latter step is expected to be effected at the election in May, 1917. In the meantime the popular favor with which the plan has been received places the company in a much more favorable light financially.

The San Francisco-Oakland Terminal Railways operates under 134 franchises, and by reason of the shortness of time some of the most important have yet to run it was found impossible to issue the long-term bonds essential to the proper financing of the desired improvements. When it became apparent that in spite of the urgent need of additional facilities there was no prospect of any relief, a committee of ten prominent citizens was organized to study the subject. This was in May, 1916. After considering the solution adopted in several Eastern cities the plan now in effect in Kansas City was selected as, in the main, most suitable to Oakland conditions, and the committee then drafted the amendments to the city charter, which it would be necessary to enact in order to provide a somewhat similar plan for the territory served by the Key Route System.

In reviewing the conditions under which the Key Route System now operates, the committee commented upon the fact that the 134 franchises could not be expected to possess workable provisions since they had been granted under entirely different conditions. Some were granted to competitive companies, most of them before the universal transfer was contemplated, some of them overlap, and all were for terms ranging from twenty-five to fifty years.

In planning a new basis of operation it was desirable, the committee believed, to avoid the temptation to neglect improvement on a line as the expiration of the franchise approached. Also, it was desirable to provide for the taking over of the electric railway properties by the city if municipal ownership should at some time be favorably considered. These two considerations were embodied in the plan offered as a solution and at the same time the plan was arranged so that it afforded the company a guarantee of sufficient tenure of rights to warrant the financial support required.

The essential feature of the charter amendment adopted is that it now becomes possible for the city to offer any corporation now operating a public utility a resettlement franchise in exchange for all the separate franchises held by that company. The resettlement franchise is to stipulate the value of the property involved, as determined by the State Railroad Commission, and is to give the company the right to operate indefinitely, subject always to the right of the city to acquire the property upon the vote of the people and after a six months' notice of such intention, the price to be based upon the value stated in the franchise. Provision is also made for the formation of a board of control in which the city shall have a representation equal to that of the company. This board will pass upon expenditures for betterments and extensions for the purpose of avoiding extravagant and improvident expenditures and at the same time the citizens will be assured of the necessary activity in this direction. The same board is to determine the value of the additions, improvements and betterments, as well as the depreciation, that have occurred since the appraisal by the Railroad Commission, should the city take over the properties.

The city is to receive not less than 55 per cent of the net operating revenue of the road, which is defined as the "earnings which remain after the payment of wages, insurance, taxes, repairs, depreciation and 6 per cent per annum upon the valuation of the property fixed by the State Railroad Commission." This is in lieu of the present requirements which range from one-fourth of 1 per cent to 3 per cent of the company's gross earnings.

Subsequent to the adoption of the resettlement franchise plan, when it is desired to grant franchises for new lines, there is to be advertisement of such intention and sealed bids for providing the desired service are to be received. The successful bidder is to be awarded an indeterminate franchise prepared according to the same terms as the resettlement franchise plan. Should the city decide not to take over the properties under the new plan, it can assign its rights to purchase to a third party under the same indeterminate franchise conditions.

In Oakland it was necessary to use the initiative to put the proposed amendment to the charter on the general ballot. The 8500 signatures required for this purpose were secured twice over without great effort, but the campaigning for the election was not such an easy matter. However, good organization secured the passage of the amendment. The plan of the campaign was laid out so as to utilize methods of personal appeal as far as possible. The citizens' committee, believing in the fairness of the measure, adopted the policy of simply educating the public to the meaning of the new plan, and the results more than justified the belief that the public would readily respond to such treatment.

A list of registered voters in each precinct was also sent to some resident in that precinct whose opinion was believed to carry greatest weight, and he was asked to mail a personal appeal to each voter in the precinct. How well this plan worked is shown by the fact that the amendment carried in 238 out of 241 Oakland precincts, and although the majority was less in Berkeley, it also carried there by a safe margin.

On the day of the election friends of the measure who owned automobiles were on hand to see that voters thought to be favorable to the measure were taken to the polls. It is notable that the public has been, throughout the campaign, on the side of the company and this is believed to be a result of the public policy which the company has followed in recent months. In fact, just prior to the election citizens wholly unknown to the company called up and offered their services, such as the use of their automobiles, in securing the desired vote.

DOHERTY POWER DEMANDS INCREASE

Based upon the present requirements of the properties, it is probable that Henry L. Doherty & Company, New York, N. Y., will have to buy 100,000 kw., in turbine capacity. This includes 40,000 kw. arranged for Toledo, a 12,500-kw. turbine for Denver, one of 5000 for Ozark, and one of 6250 for Warren, in addition to the recent order of a 10,000-kw. unit. Moreover, the indications in Mansfield now are that it will need a 5000-kw. turbine and another of 10,000, instead of the two 5000 units as originally planned. Salina can use 2000 kw. additional, and Bartlesville, Sedalia and Mt. Vernon have made requests ranging from 750 to 1000 kw. Similarly, Danbury desires to add to its plant, while Lincoln, Durham and Athens have equipment ordered which will probably not be delivered until well on in 1917.

BAY STATE COMPANY SIGNS WAGES AGREEMENT

Agreement Affecting 6000 Men to Continue from Oct. 1, 1916, to May 1, 1920

A new wages agreement extending from Oct. 1, 1916, to May 1, 1920, was signed on Nov. 11 by the Bay State Street Railway, Boston, Mass., and the Amalgamated Association. The agreement covers many points in relation to hours of labor and working conditions and affects about 6000 employees. A total wage increase of 4 cents an hour for blue uniform men and miscellaneous organized employees is spread through the life of the agreement. The previous graduated scale is retained as a working basis for blue uniform men's compensation. For the first period of the agreement, which expires May 1, 1917, wages are increased 2 cents an hour; for the second year, 1 cent an hour, and in the third and fourth years, an increase of 0.5 cent an hour a year is established. The new rate in cents an hour therefore may be tabulated as follows:

Term of Service	Oct. 1, 1916, to May 1, 1917	May 2, 1917, to May 1, 1918	May 2, 1918, to May 1, 1919	May 2,1919 to May 1, 1920
First six months...	26.5	27.5	28.0	28.5
Second six months..	27.0	28.0	28.5	29.0
Second year........	28.0	29.0	29.5	30.0
Third year	29.0	30.0	30.5	31.0
Fourth year	30.0	31.0	31.5	32.0
Fifth year	31.0	32.0	32.5	33.0
Sixth year, etc.....	32.0	33.0	33.5	34.0

The agreement contains full provision for arbitration of its terms along the line of a selection of a representative by each party, followed by the choice of a third member if feasible. In case a disagreement remains after six days of deliberation by the officers of the company and of the union, the selection of the third member of the board is to be determined by President Sullivan of the company and President Mahon of the Amalgamated Association.

Shopmen and employees of miscellaneous departments are to receive the same rates of increase in cents an hour as the platform men, added to the existing rates of pay of the miscellaneous employees.

Under the agreement no employee is to be assigned to snow plow work against his wishes so long as juniors on the list are available. Foremen on snow plow work are to receive 45 cents an hour, and other blue uniformed men in this work are to receive 40 cents. This rate also applies to the crews of cars pushing plows, with the exception of passenger cars pushing for one hour or less, and including salt cars, flat cars running in snow work, etc. At least three men are to be provided for each plow. When practicable the running period in snow work is not to exceed twelve hours for each crew, and in no case is a crew to be required to work more than six hours in snow service without time off for meals. The company agrees to pay for meals under snow fighting conditions.

An allowance of 15 cents for each report is to be made to conductors preparing accident reports after the close of their regular day's work. The agreement provides that nine months' work without error entitles a man to a clear record, and the company agrees to establish a duplicate card system of discipline records, one copy to be kept by the local superintendent and one by the employee on request. The employee may have the full particulars of his record, explanations, etc., inscribed on his card if he so desires.

Schedules are to be posted ninety-six hours before going into effect, the picking of runs to begin thirty-six hours after posting and to be concluded within thirty-six hours. At each carhouse runs are to be chosen at least three times a year, upon request. Leaves of absence are not to exceed thirty consecutive days in any three months unless on account of illness or absence from the United States. The company agrees not to discriminate against any member of the union and the latter agrees not to discriminate against any employee because of failure to become a member of the association. In the arrangement of schedules, as many runs as possible are to be planned for nine hours in eleven consecutive hours, the remainder so far as practicable being not less than eight or more than nine and five-tenths in twelve consecutive hours. Not more than 20 per cent of the total runs, however, may exceed twelve hours but not fourteen consecutive hours. Runs are to be scheduled on the basis of a six-hour limit of continuous work, and in no case is the run to exceed seven and a quarter hours straight time if unsatisfactory to the men in the local carhouse. A relief of at least one hour is to be allowed for dinner and supper.

Men having regular runs except in snowplow work and an outside time of more than twelve hours are to be paid 20 per cent extra compensation, and after the first hour at the rate of 35 per cent extra. The basic principle of the work of extra men is to be nine hours in twelve, and only in extreme cases is work beyond fourteen consecutive hours to be permitted. Extra men reporting are guaranteed a minimum of six hours' work in fourteen consecutive hours, work performed after fourteen hours to be paid in addition to the six hours' guaranteed time. After the fourteenth hour additional compensation at the rate of 25 per cent and after the fifteenth hour, at 45 per cent, is to be allowed. Men running extra trips starting before 8 a. m. are allowed a minimum of two hours and this applies to all men reporting to cover the extra list in the early morning, except that double pay is not to be accorded. Instructors of motormen and conductors are to be paid 4 cents an hour above their normal rates. Seniority is to be observed so far as possible in the miscellaneous departments. The hours for all men in the mechanical and other miscellaneous departments are to be nine hours a day in ten consecutive hours on weekdays and eight hours in nine on Sundays and holidays. The same pay for eight hours' work on Sundays and holidays is to be made as for nine hours' work on weekdays.

GOVERNMENT OWNERSHIP INQUIRY ON NOV. 20

The first hearing in connection with the proposed congressional investigation of the subjects of government control and regulation of transportation and of government ownership of public utilities is to begin on Nov. 20 in the Senate office building at Washington. A statement outlining the purpose and scope of the investigation by Senator Francis G. Newlands of Nevada, who is chairman of the committee, has just been mailed to members of the Interstate Commerce Commission and state railroad commissions, commercial, farming and banking organizations and to about forty economists and publicists, as well as to the representatives of the railroads and their employees, The statement was issued for the purpose of inviting all who are interested in, or have any information regarding the subjects of the inquiry, to express their views either by written communication or at the oral hearings.

The resolution creating the committee calls for a report to Congress on or before the second Monday in January, but it is assumed that an extension of time will be granted and tentative plans have been made for an inquiry that may require nearly two years for its completion. It is expected to hold hearings in the principal cities of the country as well as at Washington.

TRACK REMOVAL ORDINANCE IN COURTS

The City Council of Kansas City, Mo., recently passed an ordinance, killed at a previous meeting, for the removal of the street car tracks from a part of McGee Street. An injunction was secured at a late hour that night, and served after midnight on P. J. Kealy, president of the company, to prevent the immediate compliance with the ordinance. The Mayor did not sign the ordinance, and has not yet done so. Following the issuance of the injunction against the enforcement of the ordinance to remove the tracks, came proceedings in the State courts to enjoin the lower courts from interfering with the act of the Council.

Several weeks ago, when an ordinance was pending for the removal of the tracks, a restraining order was secured from the county courts against the passage of the ordinance. At that time a writ of prohibition was asked of the Supreme Court to prevent the lower courts from interfering. The Supreme Court granted the writ, but not until the judge of the lower court had dismissed the restraining order. Then the removal ordinance was passed.

The present proceedings in the Supreme Court will, it is said, be carried through for the purpose of settling the question as to whether the county courts can interfere with the legislative functions of the city government.

UNION MEN QUIT IN INDIANAPOLIS

108 Out of 900 Trainmen Fail to Take Out Cars on Nov. 10—Service Not Interrupted

Following the hearing of the demands of the minority employees of the Indianapolis Traction & Terminal Company, as reported in the ELECTRIC RAILWAY JOURNAL of Nov. 4, page 988, Robert I. Todd, president of the company, caused an investigation to be made in the different departments to ascertain how many employees had authorized the committee to act for them. It will be recalled that at the hearing previously referred to the committee claimed to represent a majority of the employees but would not state how many, in spite of the fact that 80 per cent of the car service men had already signed the new wage scale and continuation of the individual working agreement of the company. As a result of Mr. Todd's inquiry, at one power station it developed that the committeeman coming from this branch did not represent any of the thirty-six men employed in the station, other than himself, and the station employees prepared a signed statement to that effect. Similar conditions were found to prevail in other branches of the service.

Mr. Todd then forwarded a letter to the committee advising the members of the facts and calling attention to the misrepresentations they had made at the first hearing. The attention of the committee was also directed to that section of the proposed contract which required all the employees of the company to become members of the Amalgamated Association, and their attention was also called to the injustice of attempting to force even one man into an organization as a condition of holding his position. The members of the committee were advised that for a few of the employees to attempt to force such a condition upon the majority of their fellow employees and upon their employer was carrying the matter to extremes, and that as a condition to further negotiations the demand for a closed shop and the demand that the company negotiate and contract with the Amalgamated Association would have to be withdrawn. The company promised that if this was done it would discuss with the committee, as a committee of employees, the merits of the other demands of the committee, that the committee would be expected to bring to the hearing on the afternoon of Nov. 9 a complete list of the employees they were authorized to represent.

When the committee appeared before Mr. Todd on Nov. 9 the members failed to comply with the conditions set out in the letter to them, and negotiations were broken off. The company then posted notices in the various carhouses setting forth an abstract of the injunction issued by the United States District Court on Nov. 7, 1914, enjoining officials and agents of the Amalgamated Association, officials and members of other labor unions, employees and other persons from interfering with the operation of cars, or persuading, intimidating or interfering with employees who are working under the individual contract of the company, which was declared in full force and effect. The employees were also requested to report to the office any such attempts to interfere with their work, in order that the matter might be brought before the court. Large display advertisements were placed in the principal newspapers and upon the front end of the cars notifying all persons that they would be liable to contempt proceedings in the Federal Court if they attempted to interfere with the operation of cars. A notice was also issued to the minority organized employees, advising them that the company again extended to them the privilege of signing the working agreement with car service men and deriving the benefit of the increased wages which had been accepted by more than 80 per cent of the trainmen. In order that the organized men might avail themselves of this opportunity they were given until 6 p. m. on Nov. 11 to sign the agreement, provision being made that they should be allowed sufficient time off, with pay, to do so.

Several of the union men signed the agreement, but during the day of Nov. 10 108 out of approximately 900 trainmen employed on the city lines failed to take out their cars. Their places were immediately filled by men on the extra list so that no interruption of service occurred except during the rush hours, when a few tripper runs were not operated.

On the night of Nov. 10, a mass meeting of the labor organizations was called by the Central Labor Union, at which its president, Otto Ray, was served by the United States marshal with a copy of the federal injunction restraining anyone from interfering with the operations of the Indianapolis Traction & Terminal Company. W. D. Mahon, international president of the Amalgamated Association, and Magnus Sinclair, executive board member, who were to have advised the organized men as to what action they should pursue, failed to appear. The men were told not to take out their cars, but to attend another meeting at 10 a. m. on Nov. 11, but again no action was taken.

An advertisement was inserted in the newspapers by labor unions, in which the facts with respect to the conditions of labor and the wages paid were distorted. In this advertisement it was also claimed that the men had been "locked out" by the company in an effort to break up their union.

In reply, the company published a full statement of the situation under the heading "Street Car Men Are Satisfied." The statement then gave a short history of the contract, statistics of the average and minimum wages paid, an account of how an employee may appeal in case of discipline to a special board of which three of the five members are fellow employees, etc. Figures were also given of wages earned per week by some of the men who claimed to have been "locked out" and an explanation that the trouble was due because less than 20 per cent of the car service employees found they could not force a closed shop and dominating control upon the 80 per cent majority.

Practically no disorder occurred, even at the outer terminals of the street car lines. The police department handled the situation most efficiently, permitting no labor sympathizers to gather on the streets or interfere with the operation of cars. The men who had failed to sign the working agreement at the expiration of the time fixed were considered by the company as having resigned, and their runs were assigned to men on the extra list.

A committee of the so-called "locked out" employees arranged for an audience with Governor Ralston on Nov. 14.

INDIANAPOLIS BOARD OF DISCIPLINE

The Indianapolis Traction & Terminal Company, Indianapolis, Ind., on Nov. 9 announced the establishment of a board of discipline to consist of twenty employees of the company from the various carhouses, three of whom may be chosen by a dissatisfied employee to act with two representatives of the company as a board of arbitration to pass finally upon all matters of discipline. Three members of this board of discipline and two representatives of the company are also empowered to take up any suggestion or complaint of any employee concerning the rules, working conditions, discipline or method of carrying on the business of the company, to investigate the complaint or suggestion and make a report to the president of the company. The order establishing the board of discipline follows:

"The company will provide boxes with four compartments plainly marked for each of the four carhouses. During the month of December each year each carhouse shall choose by popular vote five men whose names shall be placed in the box bearing the name of the carhouse at which they are employed. These twenty men shall constitute the board of discipline. To be eligible to be chosen on this board the men must have been regularly employed in car service by this company for at least three years.

"Any employee who is dissatisfied with a decision by the superintendent relating to discipline may take his case to the president and to the board of arbitration under the provisions of the working agreement with car service men. Or, if he so desires, he may come to the office of the superintendent and by lot may himself choose one name each from three of the boxes, excluding his own carhouse. The three members of the board of discipline so chosen, together with the superintendent and assistant superintendent, shall meet thereafter as soon as possible and hear all the evidence relative to the matter and decide the man's case, and their decision shall be final.

"Any car service man who has any suggestion or complaint to make concerning the rules, working conditions, discipline or method of carrying on the business may have the same considered by a board constituted of the superintendent, assistant superintendent and three members of the board of discipline chosen by lot from three different carhouses, excluding the carhouse from which the suggestion comes, which board having considered the same shall make its report and recommendation direct to the president of the company. Nothing in this rule, however, shall deprive any man of the right to take any complaint to the board of arbitration as provided in the working agreement with car service men."

As explained in the notice, the privilege offered the men of taking their cases before the board of discipline for a hearing is optional, and in no way supplants the Public Service Commission of Indiana, the arbitration board provided in the individual working agreement. The company will pay the members of the board of discipline their regular rate of wages for the time they put in when hearing and considering cases, and in addition thereto the sum of $5 a year.

HEARING BEGUN ON CLEVELAND POWER CONTRACT

The hearing on the question as to whether the Cleveland (Ohio) Electric Illuminating Company is to receive the contract for furnishing power for the Cleveland Railway was begun before the board of arbitration on Nov. 9. L. P. Crecelius, superintendent of power of the railway, was the first witness. He said the company now generated 60 per cent of its power and bought the other 40 per cent from the Illuminating Company. He estimated that there would be a saving of $240,000 a year from buying 30 per cent more, making 70 per cent in all. The Cedar Avenue power house of the railway, which is to be abandoned, produced the 30 per cent in question.

On the following day Fielder Sanders, street railway commissioner of the city, was the witness until noon. He testified to the effect that he had conducted negotiations with the municipal plant and had secured a bid for 54 000,000 kw. a year. The Illuminating Company, already having a contract with the railway for furnishing a portion of its power, was able to bid on 120,000,000 kw. annually. On the face of the bids the municipal bid was lower than that of the Illuminating Company, but his engineers had informed him that the company's bid was the lower, when the entire supply was considered. Mr. Sanders said that while he wanted the city plant to get the business, he felt that he must guard carefully the cost of the additional power to the railway on account of its effect upon fares. By dismantling the old plant and buying power from the Illuminating Company the railway would in five years get back the value of the plant and in the next ten years would save $2,000,000 in the cost of power. That would mean about $3,000,000 in fifteen years. Mr. Sanders thought that this would have a favorable effect on the rate of fare. He said that the Illuminating Company was prepared to furnish the necessary power at once, while the city asked for eighteen months in which to install additional generating equipment. The city plant was carrying a full load now and had applications from several thousand homes for domestic service.

W. E. Davis, light commissioner of the city, announced on Nov. 14 that the city will submit a new power bid based upon the cost of producing the power. On the same day Robert Orr, general manager of the Duquesne Company, Pittsburgh, testified that the Illuminating Company was not properly protected in its contract, in view of the very low rate it has proposed. The protective clause in the contract provides that, at the end of five years, new bids may be received on condition that they are 10 per cent or more below the rate at which power is being furnished. The city objects to this clause. Director of Law Fitzgerald stated on the previous day that there was a working alliance between the Cleveland Electric Illuminating Company and the Cleveland Railway. He objected to the 10 per cent clause and said that the railway wanted to buy all its power eventually. President Stanley of the railway said unofficially that the company did expect to buy all its power later on, but he declared he knew of no alliance between the companies. He was doing what he felt was best for the stockholders and patrons of the road and he did not believe it would be the best thing for the municipal plant to take the contract.

The voters at Cleveland on Nov. 7 approved a bond issue of $1,750,000, from the proceeds of which additions to the building and equipment of the municipal light plant will be made.

CONFERENCE ON SAFETY AT BOSTON DRAWBRIDGES

A conference between Mayor Curley of Boston, Mass., President Matthew C. Brush of the Boston Elevated Railway, President P. F. Sullivan of the Bay State Street Railway, President Charles L. Edgar of the Edison Electric Illuminating Company of Boston, Commissioner of Public Works Murphy, Deputy Commissioner Sullivan, Joseph A. Rourke, head of the Boston High Pressure Fire Service and John E. Carty, engineer in charge of Bridge and Ferry Service, was planned for Nov. 16 to study the safeguarding of drawbridge operation. The meeting was called as an outcome of the accident of Nov. 7, when a surface car of the Boston Elevated Railway plunged into Fort Point Channel. Since the accident the company and the public authorities have been investigating all possibly related circumstances, but formal conclusions have not yet been made public. So far as has been learned up to Nov. 15 by the representative of the ELECTRIC RAILWAY JOURNAL in Boston nothing has developed to modify the preliminary view published last week to the effect that the accident was due primarily to the failure of the motorman to observe proper speed on approaching the draw.

Relative to the possibility of further safeguarding operation at drawbridges, Mr. Brush has written Mayor Curley as follows:

"Since the unfortunate occurrence at the Summer Street extension bridge we naturally have been earnestly studying the question of operation of street cars across drawbridges, with a view toward the further prevention, if possible, of similar accidents in future.

"Our rules and regulations have been extremely comprehensive and strict in matters of this kind, and apparently we have taken all precautions customary in such cases. Notwithstanding this, however, we are of the opinion that there may perhaps be development of a recent nature of which, with the co-operation of the city, we may be able to avail ourselves, which may tend still further to prevent accidents of this kind.

"All of our own engineers and operating men have been carefully going over this matter, and we have conferred with H. E. Reynolds, assistant general manager of the Bay State Street Railway, and his engineers on the same matter.

"We are of the opinion that certain steps can and should be taken along the lines of safety, and that the eventual construction of a rather pretentious but effective barrier at drawbridges should receive consideration."

In addition to the above list of conferees, Mayor Curley invited President Richard C. Maclaurin of the Massachusetts Institute of Technology to send an expert to the meeting. The representative of the ELECTRIC RAILWAY JOURNAL in Boston also was present.

CIVIC FEDERATION CALLS CONFERENCE ON STRIKE LEGISLATION

V. Everit Macy, president of the National Civic Federation, has announced the formation of a committee to make suggestions to Congress and State Legislatures for the perfection of laws providing for amicable settlements of labor disputes. The committee is to be composed of representatives of the railroad interests, of the manufacturing and agricultural interests, representatives of the railway brotherhoods, the American Federation of Labor, shippers' organizations, and of the public, represented by the United States Board of Mediation and Conciliation, the National Association of State Railway Commissioners, and the National Association of State Boards of Arbitration.

In a statement made on Nov. 13, explaining the aims of the committee, Mr. Macy said:

"The recent industrial disturbances affecting the relations between the railroads and their employees, and the public utility corporations of New York and other large cities and their employees, have brought the country again to a consideration of the question, 'What, if any, amendments can be made to the Newlands Federal Mediation act and to the State Railway Commission laws that will reduce these disturbances to a minimum in the future?'

"A committee of the National Civic Federation drafted in 1913 the measure which became the law known as the Newlands Federal Mediation act. In the recent railroad controversy, however, the machinery provided by that act seemed inadequate, and the President expects Congress to consider the matter of additional legislation in December, a bill modeled after the Canadian compulsory investigation act having already been introduced at his suggestion.

"In the case of municipal utilities, such as street railways and gas and electric light corporations, the Civic Federation, through its department on regulation of interstate and municipal utilities, drafted in 1914 a model State regulation bill, in which an effort was made to incorporate a provision enabling the various State railway commissions to take cognizance of labor disputes but at that time these State commissions did not look with favor upon the suggestion. Since then, however, a number of strikes in large cities have caused many public service commissions to change their views, and the State Legislatures this winter will doubtless have before them many proposals on this subject.

"While the questions relating to railroads can be dealt with only by Congress, and those relating to municipal utilities can be dealt with only by State Legislatures, the principles applying to both sets of problems are identical, and if a satisfactory method of procedure can be found in one case it will be just as applicable to the other."

The first meeting of the new Civic Federation committee will be held in Washington the first week in December.

CHICAGO COMMITTEE IN THE EAST

Chairman of Committee Inspecting Rapid Transit Systems Outlines Purport of Trip

The members of the local transportation committee of the City Council of Chicago which is making a tour of Eastern cities to study rapid transit problems were in New York on Nov. 9. The party was in charge of H. D. Capitain as chairman. Mr. Capitain has been chairman of the committee since May, 1915. He has served on the committee for more than four years and has been a member of the Council for four or five terms. At the headquarters of the committee in New York at the Hotel McAlpin he explained to a representative of the ELECTRIC RAILWAY JOURNAL that the trip of the Aldermen was anticipatory to the receipt by the city of the findings of Robert Ridgway, W. B. Parsons and Bion J. Arnold, appointed in January to report to the city on a unified and comprehensive system of transportation, including the present surface and elevated lines and the proposed subway. Mr. Capitain and some of the other members of the committee were more or less familiar with what had been done in the East in the interest of rapid transit, but it was deemed advisable for all of the members of the committee on transportation to take the trip and to go over the rapid transit systems in the eastern cities so as to prepare themselves better for a more intelligent understanding of the report of the engineers to the city.

Mr. Capitain said that while the members were interested in the physical properties and in the problems which had been met and overcome in the rapid transit lines in the East, they were particularly interested in the terms under which the rapid transit lines in New York, Philadelphia and Boston had been financed and were operated. He explained that one of the duties with which the engineering commission is charged was that of suggesting a financial plan covering the investments of the surface and elevated lines as well as methods for securing additional capital required by the city over and above its accrued traction fund, for subway purposes and for extensions to the elevated line.

The itinerary of the members of the party called for their return to Chicago by Nov. 18. In the meantime they were to visit Philadelphia, Brooklyn, Newark, Boston and Cleveland in addition to New York. The committee was accompanied by correspondents representing four Chicago papers, all of whom sent to their papers each day an account of a column or more covering the work of the committee for the day. Other members of the party were H. H. Evans, secretary of the committee on local transportation; R. F. Kelker, traction supervisor, city of Chicago; O. H. Tousey, representing the Board of Supervising Engineers, Chicago Traction; John F. Wallace, chairman of the railway terminal committee of Chicago, and M. S. Cressy, assistant corporation counsel of Chicago.

While the members of the committee were in New York Mr. Wallace arranged for an interview between Alderman Geiger, chairman of the Chicago Council committee on railway terminals, Mr. Cressy and Charles Peabody, a director of the Illinois Central Railroad. They are said to have secured assurance from Mr. Peabody of the early electrification of the suburban service of the Illinois Central Railroad out of Chicago if the necessary financing can be arranged.

Arbitration of Dismissals Proposed.—Officials of the South Covington & Cincinnati Street Railway, Covington, Ky., have consented to the appointment of former City Treasurer and Commissioner Harry W. Percival as third arbiter between them and their employees, in the matter of dismissal of six employees for alleged infraction of a company rule.

Men Deny Dynamiting New York Subway.—The six alleged dynamiters of the Lenox Avenue subway station of the Interborough Rapid Transit Company, New York, N. Y., appeared before Judge Delehanty in General Sessions on Nov. 13 and through their attorney, Louis Fridiger, entered pleas of not guilty. John McCourt, the seventh man indicted, was remanded to the Tombs until Nov. 15 for pleading.

Reargument of Compensation Cases Ordered.—Reargument was ordered on Nov. 13 by the Supreme Court of cases testing the constitutionality of the Washington, New York, New Jersey and Iowa workmen's compensation laws. No date was set for the rehearing. No reason was given by the court for the order. The court also directed reargument of an Ohio case involving interpretation of the Ohio employers' liability law.

Electrification of Whiteson Line Nearing Completion.—According to reports, the electrification of the Southern Pacific Company's west side line, from Whiteson, Ore., to Corvallis, will probably be completed by Jan. 1, 1917, but the operation of electric trains into Corvallis will be delayed until April or May because the equipment for the transformer plants will not be received until spring. At present the Southern Pacific Company has between 150 and 200 men on post and line crews working on uncompleted portions of the line.

Discussion of Philadelphia Agreements Postponed.—After having set Nov. 10 as the time for opening the public discussion of the proposed agreement between the city and the Philadelphia (Pa.) Rapid Transit Company for the operation of the new high-speed transit lines, the meeting was called off. Chairman Gaffney of the finance committee and Chairman Seger of the street railway committee have to consider the appropriations for 1917, and they agreed that it would be better to postpone the transit meetings until the financial matters were out of the way.

Mexican Military Authorities Equal to Occasion.—Street car operators in Matamoras, Mexico, declared a strike on Oct. 23, following a refusal of their employers to double the wages paid. The demand for higher pay followed the action of the street railway in doubling the fares. Fares were raised from 50 cents to $1, Mexican currency. It is said that the men are paid six pesos a day in Constitutionalists paper money, equivalent at present to about 12 cents United States currency. It is understood that additional demands were made and the men refused to move the cars from the carhouses until they were complied with. The military authorities took the matter in hand and threatened to shoot the men if they continued to refuse to work. The men promptly returned to work, accompanied by an armed guard. The chief business of the railway is between Matamoras and Santa Cruz, a ferry village opposite Brownsville. The line is about 2 miles and is operated by mule-drawn cars.

PROGRAMS OF ASSOCIATION MEETINGS

New England Street Railway Club

The meeting of the New England Street Railway Club at the Copley Square Hotel, Boston, Mass., on Nov. 23, will be "New Hampshire Night," in charge of J. Brodie Smith, vice-president of the club and vice-president and general manager of the Manchester Traction, Light & Power Company. Mr. Smith has secured as speaker Edwin F. Jones, Manchester, N. H., who has chosen for his subject, "Street Railways—A Look Into the Future." For twelve years Mr. Jones was city solicitor for the city of Manchester. At present he is senior member of the law firm of Jones, Warren, Wilson & Manning, attorneys for the Manchester railways.

American Society of Mechanical Engineers

The tentative program has been announced for the thirty-seventh annual meeting of the American Society of Mechanical Engineers in New York, Dec. 5-8. Among the papers of interest to electric railway operators scheduled to be presented are the following:

"Water for Steam Boilers—Its Significance and Treatment," by Arthur C. Scott and J. R. Bailey.

"Graphic Methods of Analysis in the Design and Operation of Steam Power Plants," by J. S. Pigott.

"Mechanical Design of Electric Locomotives," by A. F. Bachelder.

There will also be a public hearing on Dec. 8 by the boiler code committee which is engaged in the work of establishing uniform rules and legislation throughout the country for the construction and operation of steam boilers.

Academy of Political Science

The annual meeting of the Academy of Political Science is to be held at Earl Hall, Columbia University, New York, on Wednesday and Thursday, Nov. 22 and 23.

The first session is to be held on the afternoon of Nov. 22. The topic will be "Governmental Mediation and Arbitration."

The second session will be held on the evening of Nov. 22. The topic will be "Trade Unions and Compulsory Arbitration."

The third session will be held on the afternoon of Nov. 23. The topic will be "Trade Unions and Mediation and Conciliation."

The fourth session will be held on the evening of Nov. 23 at the Hotel Astor at 7 o'clock. The occasion will be the annual dinner of the academy. The topic for discussion will be "Recent Aspects of Labor Disputes Affecting Public Service Corporations." Oscar Straus will preside.

Central Electric Railway Association

Delegates to the convention of the Central Electric Railway Association at the Secor Hotel, in Toledo, Ohio, on Nov. 23 and 24, will be welcomed to that city by Charles M. Milroy, Mayor of Toledo. A. Benham, president of the Central Electric Railway Association, will respond to Mr. Milroy. The following is the program of papers scheduled for presentation before the delegates on Nov. 23.

Paper, "Headlights," by K. W. Mackall, electrical engineer of the Ohio Brass Company, Mansfield, Ohio.

Address, "The Electric Railway Industry," by Frank R. Coates, president of the Toledo Railways & Light Company.

Address, "Safety," by Harold W. Clapp, general superintendent of the Columbus Railway, Light & Power Company, Columbus, Ohio.

Address, "Electric Railway Freight and Express," by Nathan Rumney, general freight and express agent of the Detroit (Mich.) United Railway.

The program for Nov. 24 follows:

Address by F. W. Coen, vice-president and general manager of the Lake Shore Electric Railway, Sandusky, Ohio.

Paper, "Car Architecture," by L. B. Stillwell, New York.

In addition to the foregoing papers and addresses it is expected that L. S. Storrs, president of the American Electric Railway Association, and James P. Barnes, president of the New York Electric Railway Association, will be present and address the meeting.

Central Electric Railway Accountants' Association

The program has been announced for the annual and thirtieth meeting of the Central Electric Railway Accountants' Association, to be held at the Hotel Gibson, in Cincinnati, Ohio, on Dec. 8 and 9. The executive committee of the association is scheduled to meet at 9 a. m. on Dec. 8. At 10 a. m. the regular session will be begun with the address of the president and the presentation of the reports of the executive committee, the standing committee on passenger and freight accounts, the question-box committee and the secretary and treasurer. It is expected that this program will take up the entire morning session. At the afternoon session on Dec. 8 the following addresses are scheduled for presentation:

Address by P. H. Diehl, district manager of the Railway Audit & Inspection Company, Chicago, Ill., on a subject to be announced.

Address, "Electric Light and Power Accounting," by A. E. Dedrick, auditor of the Mahoning Valley Railway, Youngstown, Ohio. At this session the report of the electric light and power accounts committee will be presented and there will be a discussion of the form of annual report to the Interstate Commerce Commission.

The program of addresses to be presented on the morning of Dec. 9 follows:

Address, "Recent National Legislation Affecting Electric Railway Accounting," by A. C. VanDriesen, chief accountant of the Toledo Railways & Light Company, Toledo, Ohio.

Address, "A Clearing House for Interline Account Settlements of Electric Railways," by E. L. Kasemeier, auditor of the Ohio Electric Railway, Springfield, Ohio.

At the conclusion of the presentation of these papers general business will be transacted and officers for the coming year will be elected.

Pennsylvania Street Railway Association

The program has been announced for the meeting of the Pennsylvania Street Railway Association on Dec. 12 and 13, at the Adelphia Hotel, Philadelphia, Pa. The meeting will be called on the roof garden of the hotel at 11 a. m. The morning session will be devoted to the president's address, the presentation of the report of the secretary-treasurer and the appointment of committees. The afternoon session will be called at 2 p. m., and the following subjects will be discussed:

"Fire Insurance and Prevention." (a.) Co-operation in Fire Insurance, by E. W. Bowman, Supervisor of Insurance of the Philadelphia Rapid Transit Company. (b.) Inspection, by H. W. Forster, general manager of the Independent Inspection Bureau.

"Life Insurance." (a.) Employees Group Insurance, by W. F. Chamberlin, superintendent of the Group Insurance Division of the Travelers Insurance Company.

"Accident and Casualty Insurance." (a.) Some Thoughts on Liability, Casualty, Judiciary, Fidelity, Burglary and Other Forms of Insurance, by M. S. Bowman of the Accident and Casualty Department of the Travelers Insurance Company. (b.) Precaution Against Accident, by A. G. Jack, claim agent of the Southern Pennsylvania Traction Company. (c.) Public Safety Crusades, by Beatrice V. Clinch of the Philadelphia Rapid Transit Company.

Question Box.

There will be an informal dinner on the evening of Dec. 12, on the roof garden of the hotel.

The session on Dec. 13 will be called at 9 a. m. The subjects to be discussed follow:

"Use of the Electric Railways of Pennsylvania in Connection with Mobilization and National Defenses," by Lieut. Col. Chauncey B. Baker, U. S. A.

"Taxation," by Boyd Lee Spahr.

"Lightning Protection," by a representative of the General Electric Company.

"Electric Welding," by E. A. Hoffman, engineer of maintenance of way of the Wilkes-Barre Railway.

"Status of the Jitney," by D. I. McCahill of the West Penn Railways.

There will also bo an open discussion of the question of economies made necessary by present-day problems in labor and materials.

Financial and Corporate

ANNUAL REPORT

Columbus Railway, Power & Light Company

The income statement of the Columbus Railway, Power & Light Company, Columbus, Ohio, for the years ended Dec. 31, 1914 and 1915, follows:

	1915		1914	
	Amount	Per Cent	Amount	Per Cent
Railway operating revenues	$2,039,383	65.5	$2,086,269	68.0
Power, light and heat operating revenues	1,072,670	34.4	968,238	31.6
Non-operating revenues	1,122	0.0	11,791	0.4
Total gross revenues	$3,113,175	100.0	$3,066,298	100.0
Operating expenses and taxes	1,846,437	59.3	1,886,745	61.5
Gross income	$1,266,738	40.7	$1,179,553	38.5
Deductions from income	476,281	15.3	479,461	15.6
Net income	$790,457	25.4	$700,092	22.9

During the last year the total revenues increased $46,877 or 1.5 per cent. This arose from an increase of $104,432 or 10.8 per cent in power, light and heat operating revenues and from a decrease of $46,886 or 2.2 per cent in railway operating revenues and $10,669 or more than 90 per cent in non-operating revenues. The operating expenses and taxes decreased $40,308 or 2.1 per cent, so that gross income gained $87,185 or 7.4 per cent. Deductions from income showed a slight decrease, so that after the payment of $587,229 for dividends as in 1914, there was left a sum of $202,227 available for depreciation, etc., as compared to $112,862 in 1914.

Important additions were made to the railway properties during 1915, notable examples being a crane car for the handling of heavy material with speed, safety and economy; two special snow-handling machines, and a street-flusher car.

For 1915 as compared with 1914, the results of the safety-first propaganda were a 12 per cent reduction in boarding and alighting accidents, a 15 per cent reduction in collisions between cars and teams, and a 36 per cent reduction in collisions between cars. Collisions between cars and automobiles showed practically no change, although there was an increase of 40 per cent in automobiles in Columbus.

Miscellaneous comparative statistics for the railway department in 1914 and 1915 are given below:

	1915	1914
Revenue passengers	61,062,066	62,837,925
Transfer passengers	15,154,460	16,111,634
Total passengers	76,216,526	78,949,559
Per cent of transfers to total passengers	19.88	20.41
Revenue per revenue passenger in cents	3.20	3.19
Revenue per passenger, including transfers, in cents	2.56	2.54
Car mileage	8,204,525	8,376,901

NOTES TO BE RETIRED

The Republic Railway & Light Company, Youngstown, Ohio, has sold to Harper & Turner, Philadelphia, Pa., $3,500,000 of preferred stock of the Mahoning & Shenango Railway & Light Company, its chief subsidiary. Approximately $3,000,000 of this preferred stock is deposited as collateral behind the $3,000,000 note issue of the Republic Railway & Light Company. From the proceeds of this sale the Republic Railway & Light Company will pay off the entire note issue which would mature Dec. 1, 1918, and these notes will be called for redemption at 100½ and interest. On account of the satisfactory earnings of the subsidiary properties, the directors of the Republic Railway & Light Company consider it wise at this time to fund permanently its $3,000,000 of short-time securities, thereby strengthening the credit of the holding company and placing in a more advantageous position to acquire additional properties to round out its electric light and power and railway business in Ohio and Pennsylvania. After the retirement of these notes the Republic Railway & Light Company will have only preferred and common stock outstanding.

MAYOR CURLEY ASKS SQUARE DEAL

Tells Commission Boston Elevated Should Have Relief if Not at Fault for Present Condition—Favors Lower Taxes Rather Than Higher Fares

Mayor Curley of Boston, Mass., on Nov. 10 told the special legislative commission on the finances of the Boston Elevated Railway that, if in the commission's opinion the management of the company has striven for maximum efficiency in operation, the city of Boston should favor granting relief to the company. The Mayor believed the conclusion to be inevitable that the company must obtain relief in some form if it is to meet the reasonable requests of the public for additional rapid transit facilities. The company's stock is generally admitted to represent actual value, and its dividends have never been in excess of 6 per cent. The attention of the commission, therefore, must be confined to the question of responsibility for the present financial condition of the company. If this is due to the company's own fault, then apparently it is not entitled to some of the measures of relief desired. If, on the other hand, the commission finds that the company's condition is not due to improper management but is caused by its attempt to respond more rapidly to the public demand for increased transportation facilities than its resources would warrant, then it would appear to be a case which calls for extraordinary relief through legislative action.

In regard to the necessity of giving more than temporary relief, Mayor Curley said:

"If you find that a proper case of relief has been made out, I trust that you will not perform only half of your task, *viz.*, to meet the present financial difficulties of the company without taking into account further difficulties that will arise if the still more extensive program of tunnel and subway development is carried out in the near future. If you find that under the limitations of the 5-cent fare the company cannot finance the tunnel and subway undertakings which this community has a right to demand shall be accomplished, then you will be called upon to recommend a radical remedy, one which will go to the root of the trouble and provide a permanent cure."

Taking up specific suggestions that have been made for the relief of the company, Mayor Curley said that as far as providing additional capital is concerned, it may be sufficient to have the State buy the Cambridge Subway and lease it to the company for sufficient rental to reimburse the State for the expenditure. This will be in effect only a loan of State credit to the company, just as the city of Boston lends its credit as a means of procuring tunnel and subway construction. Quite apart from any question of financial relief to the company, however, the mayor advocates State ownership of the Cambridge Subway because he believes that private ownership of the subways and tunnels under the street is prejudicial to the interest of the community. The sooner the Boston system is applied to the Cambridge Subway, the better it will be for the future.

Another means of relief which in the Mayor's opinion will harm no one, is the return by the State of $500,000 deposited by the company as a guarantee for the payment of land damage claims. The 8-cent check used between the Boston Elevated Railway and the Bay State Street Railway should be abolished in the interests of non-discrimination. Moreover, additional relief would come in the granting of legislative authority to the company to take additional land so as to inclose areas at transfer points. This would enable the company to cut down operating expenses to some extent, and it would reduce the loss now caused by the improper use of transfer checks. Regardless of any question of financial benefit to the company, the Mayor strongly advocates the granting of this authority in the interest of the public itself, since these inclosed areas promote the safety, convenience and comfort of the public.

If the commission, however, is brought face to face with the problem of providing relief either through increased fares or a temporary reduction of company taxes, Mayor Curley believes that it will find itself in serious difficulties. The traveling public will oppose increases of fare and municipalities will oppose reduction of taxes. If one of these forms of relief must be adopted, in the Mayor's view it would be better for the community as a whole to have a reduction made in taxes than to have relief come through increased fares. If a choice must be made between these two evils, he would unhesitatingly recommend a reduction in taxes.

In explanation of this point of view, Mayor Curley stated that an increase of fares would, in this particular case, be surrounded with great practical difficulties. Legislative opposition would be sure to arise owing to protests on the part of the traveling public. Moreover, there would be serious obstacles to the successful working of the increased fare schedule, whether the schedule provided for a uniform increase throughout the territory or increased fares on only the longer runs. Practically, as far as the public is concerned, there is no great difference whether relief comes in the form of increased fares or temporarily reduced taxes. The great majority of the people living in the municipalities served now use the company's cars, and a still greater number will use them when more rapid transit facilities are furnished. All the people, car users or otherwise, share in the benefits accruing from improved transportation—that is, from increased valuations of property and the resulting reduction of taxes or the extension of municipal service. On the whole, however, less hardship would result from a temporary reduction of taxes.

In closing, Mayor Curley stated that it would be unfortunate for the city if the result of the present inquiry were only to give relief to the company at the expense of the city's own street development or its hospital, public health or public library service, for example. He felt, therefore, that if the commission should recommend a temporary reduction in the taxes paid by the company it should also recommend as an integral part of the proposed legislation, authority to increase the tax limit of the city to an extent sufficient to make up the deficit caused by the reduction in the company's taxes.

I. C. C. ISSUES ACCOUNTING ANSWERS

Another Series of Questions and Tentative Answers Under the Uniform System of Accounts Prescribed by Commission for Electric Railways

Another series of tentative answers to questions raised in connection with the uniform system of accounts prescribed by the Interstate Commerce Commission for electric railways has just been released by the commission. As these answers have not received the formal approval of the commission, however, it should be understood that the decisions do not represent its final conclusions, and that they are subject to such revision as may be thought proper before final promulgation in the accounting bulletins of the commission. The questions raised, and the answers made to them, follow:

Q. This company built an extension to its line, and property owners served by the extension agreed to pay $25,000 toward the cost thereof. How should this contribution be accounted for?

A. The amount donated by the property owners should be credited to profit and loss account No. 305, "Donations." The cost of constructing the extension should be included in the appropriate road and equipment accounts. See the second paragraph of the text and the note of account No. 305, "Donations."

Q. In connection with the reconstruction of a track over which operations are being conducted at the same time, it is necessary to have flagmen and watchmen where the work is being done, for the purpose of regulating the operation of cars and directing passengers. To what account should the wages of such employees be charged?

A. To account No. 66, "Miscellaneous Car Service Employees."

Q. To what account should be charged the cost of paper dials for watchmen's clocks?

A. To operating expense account No. 94, "Stationery and Printing."

Q. Is it permissible to credit operating revenue accounts with amounts representing the cost of transporting men engaged and materials used, in the operations of a company?

A. The rules contained in the uniform system of accounts do not permit charging operating expenses and concurrently crediting operating revenues with amounts representing the cost of transporting men engaged in and material to be used for maintenance and operation. Charges should be made to construction accounts for the actual cost (or an estimate thereof) of transporting men and material for construction purposes. The credit in such case should be made to operating expense general account VII, "Transportation for Investment—Cr.," if the cost of such transportation was charged, in the original distribution, to operating expenses.

Q. To what account should be charged the amount of a premium paid on a bond given the United States government in order to qualify a carrier to transport merchandise in bond?

A. To operating expense account No. 89, "Miscellaneous General Expenses."

Q. To what accounts should be charged rent and taxes on land leased for freight-house purposes?

A. The rent shall be charged to income account No. 217, "Miscellaneous Rents," and the taxes to income account No. 215, "Taxes Assignable to Railway Operations."

Q. To what account shall be charged amounts paid for the privilege of erecting poles to support distribution and transmission lines?

A. To account No. 23, "Miscellaneous Electric Line Expenses," or No. 49, "Transmission Systems," as may be appropriate.

Q. To what account should be charged amounts paid to other companies for the privilege of attaching wires to their poles?

A. To operating expense account No. 23, "Miscellaneous Electric Line Expenses," or No. 49, "Transmission System," according to the character of the line.

Q. Should the entire cost of purchased power be charged to operating expense account No. 59, "Power Purchased," or may the amount of power used by a work train be charged directly to the appropriate maintenance accounts?

A. The cost of all power purchased should be charged to account No. 59, "Power Purchased," as required by the text thereof. In this connection see the text of account No. 61, "Power Transferred—Cr."

Q. A portion of a company's track was laid upon a street which was later regraded by the municipality for the purpose of eliminating hills. The cost of regrading that portion of the street lying under the tracks was assessed against the company. To what account should be charged the amount of this assessment?

A. To road and equipment account No. 504, "Grading."

Q. What is meant by the term "except final distribution," as found in road and equipment accounts Nos. 505, "Ballast," 506, "Ties," 507, "Rails, Rail Fastenings and Joints," 508, "Special Work," and 509, "Underground Construction"?

A. By this term is meant expenses incident to the distribution of ballast, ties, rails, rail fastenings and joints, special work and materials used in underground construction from the storehouse or delivery point to the place where such material enters into construction. (See Case 114.)

Q. To what account should be charged rent of ground used for driveway purposes in delivering coal to a heating plant?

A. To income account No. 217, "Miscellaneous Rents."

Q. What is meant by the term "cost of transporting," as used in operating expense general account VII, "Transportation for Investment—Cr."? Is this term intended to include items of taxes, interest or return upon investment?

A. By this term is meant such expenses as have been, for practical reasons, temporarily charged to operating expense accounts, but which are properly includible as a part of the cost of construction. No credit should be made to this account for such items as taxes, interest or return upon investment, as these are not included in operating expenses.

Q. Track reconstruction work involves, as a rule, charges to both construction and operating expense accounts. Is it proper to distribute the pay of officials in charge of the engineering and track maintenance departments upon the basis of charges to construction and operating expenses?

A. If a substantial proportion of the time of officials in charge of the engineering or track maintenance departments is devoted to construction work, it is proper to include in the construction accounts an equitable proportion of their salaries, such proportion being based upon the amount of time devoted to construction work.

Q. If clerks in an executive office give substantially all of their time to the preparation of work orders and authorization for construction expenditures, should their salaries and expenses be charged to road and equipment accounts?

A. If clerks employed in executive offices give all or a substantial proportion of their time in the preparation of orders for new construction, or for additions and betterments, an equitable proportion of their salaries and expenses should be included in account No. 550, "Miscellaneous." The basis of apportionment should be upon the amount of time devoted to construction-work orders and not upon the estimated cost of construction.

Q. To what account should be charged the cost of an electric track switch installed in connection with new construction?

A. To road and equipment account No. 508, "Special Work."

Boston (Mass.) Elevated Railway.—The West End Street Railway, operated under lease by the Boston Elevated Railway, has petitioned the Massachusetts Public Service Commission to authorize an issue of $2,700,000 of thirty-year 6 per cent bonds, dated Feb. 1, 1917. The proceeds will be used to refund an issue of like amount then maturing.

Central Illinois Public Service Company, Chicago, Ill.—The Illinois Trust & Savings Bank, the Continental & Commercial Trust & Savings Bank, Halsey, Stuart & Company and Russell, Brewster & Company, Chicago, Ill., are offering jointly for subscription at 90 and interest, yielding more than 5.62 per cent, $4,000,000 of Central Illinois Public Service Company first and refunding mortgage 5 per cent gold bonds. The bonds are dated Aug. 1, 1912, and are due Aug. 1, 1852. The proceeds of the bonds will be used to retire the $3,000,000 of three-year 6 per cent collateral gold notes of the company, due on Dec. 1, 1916, and to reimburse the company for expenditures made for improvements, betterments and extensions.

Columbus, Delaware & Marion Railway, Cincinnati, Ohio.—The committee representing the holders of the first mortgage 5 per cent gold bonds of the Columbus, Delaware & Marion Railway has been enlarged by the addition of G. M. Dahl, New York, and A. Q. Jones, Indianapolis, J. I. Burke, New York, acting as secretary. The committee has adopted a new form of deposit agreement and urges immediate deposit of bonds with the Guaranty Trust Company, New York. Rudolph Kleybolte, chairman of the committee representing a substantial majority of the underlying first mortgage bonds, recently gave notice that unless the committee for the first consolidated bonds should promptly signify its intention to reorganize the property and assume the first mortgage, they themselves would be obliged to foreclose and take the property.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.—The Mahoning & Shenango Railway & Light Company has notified the Pennsylvania Public Service Commission that it proposes to issue bonds to the amount of $500,000 which will be sold to Lee, Higginson & Company, Boston, Mass., at 98 and accrued interest, the proceeds to be deposited with the trustee to be drawn down from time to time for improvements and betterments.

Springfield, Troy & Piqua Railway, Springfield, Ohio.—The Springfield, Troy & Piqua Railway on Nov. 10 made application to the Public Utilities Commission for authority to issue $280,000 of common stock and $250,000 of bonds in order that it may reimburse the estate of Asa S. Bushnell, Springfield, to which it is indebted to the amount of $670,844 for money advanced.

Steubenville & East Liverpool Railway & Light Company, Steubenville, Ohio.—A special meeting of the stockholders of the Steubenville & East Liverpool Railway & Light Company has been called by action of the board of directors to convene at the office of the company at Steubenville, on Dec. 9, to act upon the approval of a proposed contract for the leasing of that portion of the property of the company which is utilized in carrying on the electric light and power business to the Ohio River Power Company. The proposed lease is for the term of three years, with a renewal term of three years, at a rental of $90,000 a year, and is to embrace an option to sell that part of the property to the lessee for $1,500,000.

Toledo, Fostoria & Findlay Railway, Fostoria, Ohio.—The Lake Erie, Bowling Green & Napoleon Railway between Bowling Green and Pemberville has been purchased by the Toledo, Fostoria & Findlay Railway and will be operated by it. The property was sold some months ago at master commissioner's sale to a Detroit man, who has since been dismantling it. The line is 12 miles in length.

United Railroads, San Francisco, Cal.—The California Railroad Commission has requested the United Railroads to make an inventory and appraisal of its property in connection with its proposed application to readjust its finances and provide a new issue of securities. The United Railroads has not as yet made application to the commission for a change in either the ownership or financial plan of the corporation, but has advised the commission that it anticipates making a formal application. The commission states that it desires the corporation to prepare for submission, in connection with such reorganization proceedings, a complete statement of its ownership of property and the value of such property. The details of the proposed extinguishment of $44,330,100 out of $91,928,100 of capital liabilities were reviewed in the ELECTRIC RAILWAY JOURNAL of Oct. 7, page 744.

DIVIDENDS DECLARED

Central Arkansas Railway & Light Corporation, Hot Springs, Ark., quarterly, 1¾ per cent, preferred.

Citizens Traction Company, Pittsburgh, Pa., $1.50.

Cumberland County Power & Light Company, Portland, Me., quarterly, 1 per cent, common.

ELECTRIC RAILWAY MONTHLY EARNINGS

AURORA, ELGIN & CHICAGO RAILROAD, WHEATON ILL.

Period		Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Sept.,	'16	$183,593	*$124,894	$58,699	$35,935	$22,764
1 " "	'15	168,333	*114,960	53,373	36,710	16,663
3 " "	'16	590,838	*379,662	211,176	107,986	103,190
3 " "	'15	545,797	*356,352	189,445	109,758	79,687

CITIES SERVICE COMPANY, NEW YORK, N. Y.

Period		Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Oct.,	'16	$1,122,910	$20,041	$1,102,869	$393	$1,102,476
1 " "	'15	411,504	14,323	397,181	40,833	356,348
12 " "	'16	8,233,952	232,384	8,001,568	340,068	7,661,499
12 " "	'15	4,232,914	163,503	4,069,411	490,000	3,579,411

FEDERAL LIGHT & TRACTION COMPANY, NEW YORK, N. Y.

Period		Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Sept.,	'16	$203,099	*$134,446	$68,653	$49,298	$19,355
1 " "	'15	189,667	*124,600	65,067	48,787	16,280
9 " "	'16	1,860,223	*1,251,301	608,922	438,526	170,396
9 " "	'15	1,722,831	*1,141,499	581,332	443,599	137,733

GRAND RAPIDS (MICH.) RAILWAY

Period		Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Sept.,	'16	$111,638	*$72,249	$39,389	$15,842	$23,547
1 " "	'15	100,771	*68,404	32,367	14,002	18,365
12 " "	'16	1,279,977	*839,802	440,175	176,619	263,556
12 " "	'15	1,195,379	*824,876	370,503	164,282	206,221

LAKE SHORE ELECTRIC RAILWAY, CLEVELAND, OHIO

Period		Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Sept.,	'16	$152,529	*$89,152	$63,377	$36,334	$27,043
1 " "	'15	126,284	*76,711	49,573	36,127	13,446
9 " "	'16	1,207,012	*753,129	453,883	327,306	126,577
9 " "	'15	1,032,334	*671,143	361,191	324,833	36,358

LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY, LEWISTON, ME.

Period		Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Sept.,	'16	$78,549	*$50,793	$27,756	$15,134	$12,622
1 " "	'15	73,130	*42,571	30,559	15,956	14,603
12 " "	'16	785,306	*526,854	258,452	189,810	68,642
12 " "	'15	715,579	*467,213	248,366	188,860	59,506

REPUBLIC RAILWAY & LIGHT COMPANY,
YOUNGSTOWN, OHIO

Period		Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Oct.,	'16	$338,613	*$188,922	$149,691	$72,495	‡$78,291
1 " "	'15	276,355	*166,411	109,944	57,277	‡52,772
10 " "	'16	3,269,261	*1,896,062	1,373,199	700,677	‡678,101
10 " "	'15	2,511,276	*1,538,925	972,350	560,969	‡412,671

*Includes taxes. ‡Includes non-operating income.

Traffic and Transportation

DENVER TRAMWAY BULLETIN IMPROVED

Changes Suggested by Employees Adopted—Rotating Editorial Board of Employees Proposed

The October issue of the *Tramway Bulletin*, published by the Denver (Col.) Tramways, is an anniversary number, marking the opening of volume nine. The paper has been changed over to the familiar 9 in. by 12 in. size, and appears in a new dress of type. The changes in the make-up are discussed by the editor in part as follows:

"The *Bulletin* comes to you this first month of its new volume in a new dress and a larger size. As you turn the pages you will probably see other changes. All this is a working out of the many sugestions for improving the magazine which we received from trainmen, shopmen and other readers.

"In changing the size we are following the lead of all the technical magazines of the railway world and of most of the popular fiction magazines, which, as you have probably noticed, have been rapidly adopting the large page and flat form.

"With the new size we can use larger illustrations; bigger, more readable type; more emphatic headlines, and at the same time give advertisers better 'positions.'

"We have also chosen a big, postery style of cover and are going to change the cover illustration every month.

"We will use a heavier, high-grade glossy paper which will make the magazine look much more attractive and print the illustrations more clearly. The number of pages in future issues will depend entirely on the number required for the printing of the articles and news submitted for publication.

"Perhaps the best suggestion for improvement among the many that were made and adopted is that of an editorial board. This board is to be made up of four trainmen—one from each division—plus the editor and assistant editor. The board will not be author of any articles, but it will be responsible for the contents of the entire magazine and will plan and suggest the kind of articles to be written, decide who shall write them, and generally will be charged with getting out the most interesting magazine it possibly can.

"The division men on the editorial board will change each month. The day men will make up the November *Bulletin*. Then the night men will have a chance to show what they can do, and so on.

"During the year the shop men will be charged with producing a shop number, the power house men with a power house and substation number, the general offices an office number, and we are considering one other number. These special issues, while devoted particularly to their subjects, will naturally contain all matters of interest to trainmen also.

"In starting this new and improved volume, we want to ask the continuance of your past co-operation in giving us little items of news and in writing special articles. We appreciate your help."

LOUISVILLE & INTERURBAN INCREASES FREIGHT BUSINESS

An unprecedented volume of business is being handled by the freight department of the Louisville & Interurban Railway, Louisville, Ky. R. H. Wyatt, general freight agent for the company, stated that several new baggage cars have been put into service and that more such cars will probably be required. The car-lot business generally is handled by the trailers, while the express cars are devoted to package freight. The attention of the freight traffic manager has been directed to providing freight for the return hauls and for the most part it has been possible to keep all cars loaded for both way runs. Numerous specials are used daily on the various lines. From Shelbyville, Ky., the end of one of the branches, the company is hauling 500 hogsheads of tobacco to Louisville. This is trucked into Shelbyville and will supply returning loads for the railway for some time, in connection with other tobacco traffic that is being developed. The shortage of cars on the steam roads has had the effect of practically eliminating competition for the freight department of the Louisville & Interurban Railway, and the company is making the most of its opportunities, incidentally demonstrating to many interurban shippers the superior character of its service.

Close attention is being paid by R. H. Wyatt to keeping all the cars in operation continuously. The same forty-eight hours of free time and the same $1 daily demurrage charges prevail as in the case of the steam roads, but as a rule demurrage is not assessed on the average once out of fifty car lot shipments. In expediting loading and unloading of cars Mr. Wyatt and his subordinates impress on the shipper that they are anxious to get the car on the day after it is delivered.

MUNICIPAL AND PRIVATE LINE MAKE OPERATING AGREEMENT

An agreement has been reached by M. E. Sampsell, president of the Seattle & Rainier Valley Railway, and the city of Seattle, Wash., whereby the city will be allowed to operate cars of the municipal line on Fourth Avenue, down Fourth Avenue to the County-City Building, on Jefferson Street. The common user agreement provides also the exchange of transfers between the Seattle & Rainier Valley Railway and the municipal car lines on a zone basis. A. L. Valentine, superintendent of public utilities of the city, reports that municipal cars operating from Thirteenth and Nickerson Streets to Third Avenue and Stewart Street on Division A will be routed to the County-City Building. Transfers between the city line and the Renton line will be exchanged under an agreement for the equal division of the fares for passengers living north of Hudson Street in Columbia City. On all fares where passengers travel beyond that point to the city limits the Seattle & Rainier Valley Railway will get two-thirds and the city one-third of the fare. The city will pay a rate of 1 cent per kilowatt-hour for the power consumed by its cars on the common-user portion of the Rainier Valley line on Fourth Avenue.

Mr. Sampsell will appeal to the Public Service Commission or to the courts for relief from an order of the commission requiring it to issue and exchange transfers with the Puget Sound Traction, Light & Power Company. He contends that his company is losing $40,000 a year by the exchange of transfers.

ELECTRIC RAILWAY SALES TALK

"Selling Rides" was the subject of addresses delivered to meetings of the trainmen of the Louisville (Ky.) Railway at the first of what will be a series of monthly meetings during the winter. There are two of these meetings, one in the morning and one in the evening, so as to enable all the crews to be present. The first two of these meetings were addressed by T. J. Funk, head of the claim department of the company and for many years superintendent of transportation, and by Frank Cassell, director of sales of the Belknap Hardware & Manufacturing Company, the largest of the jobbing houses in Louisville. Samuel Riddle, superintendent of transportation, also spoke along the same lines.

The men were addressed not merely as operators of street cars, but as the salesmen who dealt with the public in the actual sale of the stock in trade the company sells. In elaborating on the figure of speech the speakers likened the conductors and the motormen to salesmen of various kinds of commodities, in which not only the quality of the article itself had to be considered, but the manner in which it was presented and delivered to the public. The talks were well received and many of the men went away saying that they had formed new ideas as to their relations to the company and to the people they carry daily.

At the head of the stairway leading to the assembly hall in the company's building an electric sign had been erected in which the subject of the addresses, "Selling Rides," was spelled out.

PORTLAND JITNEY ULTIMATUM

According to an ultimatum of the City Council, jitneys in Portland, Ore., will operate under a franchise as provided in the ordinance passed on July 19 and effective on Nov. 15, or go out of business. This was made apparent by the majority of the City Council at a recent meeting, following a demonstration by jitney men, representatives of organized labor and their friends, favoring repeal of the measure. In opposing the franchise ordinance, and asking its repeal, the representatives of the jitney interests charged that the Council was being influenced by the Portland Railway, Light & Power Company. They declared that the proposal to operate jitneys on streets not occupied by street railway lines would put them out of business. In an effort to show that the jitneys are popular, a petition signed by 16,663 jitney patrons was presented to the Council, in which a request for a repeal of the franchise ordinance was asked.

Although an application for a franchise for the operation of jitneys on various streets of the city has been filed with the Council by the Union Motor Bus Company, the Council has not acted on the petition, but the grant will not be made on the terms sought by the jitney men. The City Commissioners say the jitney should not only be regulated, but should be required to serve districts not now reached by the street railway.

PICK-UP AND DELIVERY EXPRESS SERVICE IN VANCOUVER

For some years the British Columbia Electric Railway, Vancouver, B. C., has been operating an express service over its lines between Chilliwack and Vancouver, a distance of more than 70 miles. This service was operated on the lines of freight traffic except that the movement was much faster, being practically on passenger schedule, and therefore a higher rate was charged than the prevailing freight rates. At the same time, however, these rates were somewhat lower, and in many cases considerably lower than the old line express rates for similar distances.

This service differed from ordinary express service in so far as no delivery was performed at the terminals, nor was the freight picked up for shipment. Recent developments, however, made it advisable for the company to inaugurate in Vancouver a pick-up and delivery service in connection with this express movement. This is being done with no additional charge and no increase in the rate, an electric auto truck making trips sufficient to handle the business offered, both inbound and outbound. At this time it is impossible even to estimate the effects of the improved service, as the change was made at a time when the express traffic, owing to the movement of fruits, etc., was particularly heavy.

HARRISBURG JITNEY MEASURE AMENDED

At the general election in Harrisburg, Pa., on Nov. 7, the voters passed the proposed amendment to the present jitney ordinance. The amendment is the result of the strike of the platform men of the Harrisburg Railways during the summer. For a time during the strike hundreds of jitneys were allowed to operate without complying with the city jitney ordinance, which provides for filing a $2,000 bond by drivers. After the strike was broken and the Harrisburg Railways was again giving adequate service, Mayor Ezra S. Meals insisted that unlicensed jitneys cease their operations and that the jitney rules be enforced. Opposition to the existing ordinance then arose, and an amendment was suggested to Council. Council, however, declined to act on the amendment, and put the matter up to the people to decide by initiative vote. The jitney amendment becomes effective as soon as the official vote is counted and filed. The amendment in brief provides that the jitney owner must file a bond of $50 and pay into the city treasury $5 a month until a fund of $1,000 is raised upon which suit for damages can be brought in case of accident. The license fees are fixed as follows: For the bus carrying not more than seven passengers, $10; more than seven and not more than fifteen, $20; more than fifteen, $30.

ELECTION UNFAVORABLE TO CALIFORNIA JITNEYS

At the election on Nov. 7 several measures passed in California which will place more rigid restrictions upon the operations of jitney buses. The hotly contested rights on Market Street in San Francisco for which the Jitney Bus Association by the use of the initiative had placed a measure on the ballot, was defeated by a majority of 18,000 votes. Both Sacramento and San Joaquin Counties passed regulatory ordinances for interurban buses which are practically the first interurban regulations in the State. In these counties interurban buses will now have to specify and adhere to definite routes, fares will be regulated, and should it be decided that there is no need of the buses under the public convenience and necessity laws, the right to operate can be withheld entirely. The drivers' bond in San Joaquin County becomes $10,000 and in Sacramento County $5,000.

Metal Ticket System Installed in Evansville.—The Public Utilities Company, Evansville, Ind., on Nov. 1, discontinued its use of paper tickets and put in a complete installation of metal tickets and Johnson four-dial fare boxes. The change was made over night, but the public and trainmen were forewarned and educated to the new system in advance of the change by means of special instruction classes for the men and printed circulars and newspaper advertisements for the public.

Reckless Motorists Draw Down Imprisonment Sentences.—In commenting editorially on the increased activity in connection with the apprehension of reckless automobilists in New York, the New York *World* on Nov. 12 said: "Reckless motoring cost those convicted of it $22,991 in Traffic Court fines in October. But it is in the revocation of two drivers' licenses and the twenty-five sentences to imprisonment without the alternative of a fine that the public will derive most satisfaction. These are penalties that count."

Another Massachusetts Road Seeks Fare Increase.—The Norwood, Canton & Sharon Street Railway, Canton, Mass., through its president, M. A. Cavanaugh, has petitioned the Public Service Commission of Massachusetts for permission to increase its fare from 5 cents to 7 cents. The company operates through Sharon and Norwood, in two sections. The first section of the road extends from Day and Washington Streets, Norwood, to the Neponset River bridge between Norwood and Canton. This run is about 3 miles. The second section extends from Cobbs Tavern to Garden Street, Sharon Heights, a distance of 3 miles. The road was built in 1899.

Stormy Weather Demoralizes Jitney Service.—A formal complaint was filed recently with the City Council of Los Angeles, Cal., by the Pacific Electric Railway against the irregularity of the jitney competition which dwindled from 407 machines on a fair day to thirty-five during rainy weather. Due to the sudden shrinkage in the number of jitney buses, the company was obliged to put on extra cars to take care of the traffic. The company points out that it cannot afford to employ additional men, overhaul rolling stock and increase schedules for the few months in the year when jitneys fail to operate on account of wet pavements. In Pasadena eight out of thirty-three buses operated during the rainy days, while in Long Beach less than half the jitneys were running.

New Illinois Traction Map.—The publicity department of the Illinois Traction System, Peoria, Ill., has issued for local circulation a detail map showing the steam and electric lines of Illinois. The map is 19 in. by 27 in. in size, and is contained in a pasteboard folder carrying advertisements of the parlor-car and sleeping-car service. The lines of the company, marked in heavy red, show the main interurban systems from St. Louis 175 miles to Peoria and 220 miles to Danville, together with branches and connecting divisions; also the 110-mile northern system known as the Chicago, Ottawa & Peoria, the Galesburg and its suburban system, and the Cairo system. Smaller insert maps show the Illinois Traction System's entrance over the McKinley bridge and to the terminal in St. Louis and the environs of Chicago, with the most important electric lines indicated in red.

Personal Mention

William B. McKinley, president of the Illinois Traction System, Peoria, Ill., was re-elected to his seat in Congress at the recent election.

B. C. Cobb, of Hodenpyl, Hardy & Company, New York, N. Y., who with E. W. Clark & Company, Philadelphia, Pa., have taken over the Northern Ohio Traction & Light Company, Akron, Ohio, has been elected president of the last-named company to succeed Henry A. Everett.

Otto Kurtz has been appointed auditor of the Sheboygan (Wis.) Electric Company to succeed August Westermeyer, whose resignation from the company is noted elsewhere in this column. Mr. Kurtz has been connected with the company for several years in the capacity of bookkeeper.

C. O. Snodgrass, supervisor of the Ninth and Brighton division, has been promoted to the Forty-eighth and Harrison Streets division of the Kansas City (Mo.) Railways. This is the largest division, and practically all of the men who have risen through the service have been advanced from it. Mr. Snodgrass succeeds John T. Corrigan.

August Westermeyer has resigned as auditor of the Sheboygan (Wis.) Electric Company, the successor to the Sheboygan Railway & Electric Company, to take over with Edward Hammett, who has resigned as vice-president and general manager of the company, the Northern Furniture Company, Sheboygan, Wis. Mr. Westermeyer was connected with the properties at Sheboygan for fifteen years. He entered the employ of the company there as a clerk. He was born in Sheboygan in 1878.

J. H. Lockett has been appointed superintendent of the Ogden, Logan & Idaho Railway, with headquarters at the interurban terminal in Ogden, Utah. Mr. Lockett has been connected with the Pacific Electric Railway, Los Angeles, Cal., for the last twenty years in the transportation and the mechanical departments. The last six years of his service with that company was in the capacity of general foreman in the mechanical department. Mr. Lockett succeeds J. M. Read with the Ogden, Logan & Idaho Railway.

Norman McD. Crawford, who has been connected with the E. W. Clark & Company Management Corporation, Columbus, Ohio, since March, was elected vice-president of the Columbus Railway, Power & Light Company on Nov. 14 to assist in an executive capacity S. G. McMeen, of the Management Corporation, who is president of the Columbus Railway, Power & Light Company. Mr. Crawford was president and general manager of the Reading Transit & Light Company, Reading, Pa., before he became connected with the E. W. Clark & Company Management Corporation. He was formerly president of the Mahoning & Shenango Railway & Light Company, Youngstown. He was for several years vice-president of the Ohio Electric Railway, Cincinnati, Ohio, and previously for a long time was general manager of the Hartford (Conn.) Street Railway.

Edward Hammett has resigned as vice-president and general manager of the Sheboygan (Wis.) Electric Company, the successor to the Sheboygan Railway & Electric Company, and, with August Westermeyer, has taken over and will manage the Northern Furniture Company, Sheboygan, Wis. Mr. Hammett was born in Wheaton, Ill., and entered railway work with the Aurora, Elgin & Chicago Railroad. He was promoted rapidly while with the Aurora, Elgin & Chicago Railroad, and finally entered the selling field as district manager of the Electric Service Supplies Company at Pittsburgh, Pa. He resigned from that company to become connected with the electric railway and light properties in Sheboygan, in 1910, as superintendent and purchasing agent of the Sheboygan Light, Power & Railway Company. In January, 1914, he was made general manager of the company, to succeed Ernest Gonzenbach. Mr. Hammett is succeeded at Sheboygan by Raymond H. Smith, formerly general manager of the Jackson Light & Traction Company at Jackson, Miss., as noted in the Electric Railway Journal of Nov. 11.

Henry A. Everett has been succeeded as president of the Northern Ohio Traction & Light Company, Akron, Ohio, by B. C. Cobb, of Hodenpyl, Hardy & Company, New York, N. Y., who with E. W. Clark & Company, Philadelphia, Pa., recently negotiated the purchase of the controlling interest of the Northern Ohio Traction & Light Company. Mr. Everett was born in Cleveland on Oct. 16, 1856. For a number of years he was secretary and treasurer of the East Cleveland Railroad, of which his father, Dr. A. Everett, was president. This was one of the principal constituents of the present Cleveland Railway. Under the Everett regime the company was one of the first to adopt electricity as motive power. After the first consolidation in Cleveland in which the East Cleveland Railroad became a part of what was known as the "Big Consolidated," Mr. Everett entered the independent telephone field and also the interurban electric railway field. One of his first interurban projects was the Akron, Bedford & Cleveland Railway, which is now a part of the Northern Ohio Traction & Light Company. The skepticism of many of the bankers in Cleveland as to the success of interurban railways in the early days, the financial and engineering difficulties overcome and the final triumph of the interurban line between Akron and Cleveland are told by Mr. Everett in an interesting article which appeared in the Electric Railway Journal for Oct. 8, 1904. In the early nineties also Mr. Everett, with his associate Mr. Moore, took over the Toronto Railway under a franchise offered by the city and installed electrical equipment. Later he was identified with other electric railways and telephone interests in Canada, as well as in several cities in this country and built one of the early electric railway lines in Detroit. The Everett-Moore interests also took over the Toledo Railways & Light Company and Mr. Everett was president of that company until 1908, when he retired on account of ill health. He was also interested in the syndicates which built the Cincinnati, Dayton & Toledo line, the Aurora, Wheaton & Chicago, the Washington & Annapolis, the New York & Long Island Traction Company, the Springfield & Xenia Traction Company and the Scioto Valley Traction Company. At present he is one of the vice-presidents of the Lake Shore Electric Railway, Cleveland, Ohio, and is also interested financially in the London (Ont.) Street Railway, of which E. W. Moore, his associate for many years, is president.

OBITUARY

Marshall Rust, president of the Mexico Investment & Construction Company, Mexico, Mo., operating a 16-mile electric railway between Mexico and Molino, Mo., died at Kansas City, Mo., recently, after a long illness.

Redmond Quain, one of he incorporators of the Ottawa (Ont.) Electric Railway and for some years a director of the company, died suddenly at Ottawa on Oct. 5, aged fifty-seven years. Mr. Quain was a native of Ottawa. He was a nephew of Thomas Ahearn, president of the Ottawa Electric Railway. A widow, one son and four daughters survive.

George L. Bugbee, manager of the Pacific Electric Land Company, Los Angeles, Cal., and for years one of the prominent railway figures of the West, died recently following an operation. Mr. Bugbee had been in Los Angeles for the past eleven years, and was auditor of the Los Angeles & Pacific Railway before its consolidation with the Pacific Electric Railway.

Wilbur Fisk Sadler, Jr., adjutant general of the State of New Jersey, and promoter of electric railways, died on Nov. 10 at Carlisle, Pa. General Sadler was taken ill following the mobilization of the New Jersey troops at Sea Girt, N. J. In 1892 and 1893 he built 33 miles of electric railway in Shenandoah, Girardville, Ashland and Mahanoy City, Pa., and a year later built a 19-mile electric railway between Scranton and Carbondale. In 1895 he promoted the electric railway from Pittston to Scranton, Pa. Two years later he assisted in building 33 miles of electric railway from Greensburg to the edge of Greater Pittsburgh, Pa. In 1898, General Sadler removed to Trenton, N. J., and assisted in building the Yardley, Morrisville & Trenton Street Railway and the Philadelphia, Bristol & Trenton Street Railway. General Sadler was president of the Broad Street National Bank, Trenton. He was unmarried.

Construction News

Construction News Notes are classified under each heading alphabetically by States.
An asterisk (*) indicates a project not previously reported.

FRANCHISES

Dighton, Mass.—The Bay State Street Railway has received permission from the Public Service Commission to relocate its track on Main Street, at Somerset Avenue, and on Pleasant Street, Dighton.

Springfield, Mo.—The Springfield & Western Railway, which proposes to construct a line between Springfield and Carthage, has asked the City Council of Springfield for an extension of its franchise to January, 1919. The franchise of the company expires in January, 1917. Under its terms the company was required to have 10 miles of the line in operation by that time. J. P. McGammon, Springfield, is interested. [June 12, '15.]

Newark, N. J.—The Public Service Railway has been granted permission by the Board of Works to construct new tracks on Frelinghuysen Avenue, Newark.

Buffalo, N. Y.—Two franchises recently granted by the City Council to the International Railway were submitted to voters for approval at the November election and were carried by large majorities. The franchises give the company permission to lay double tracks and operate cars in Franklin Street between Chippewa and Allen Streets and in Elmwood Avenue, from Hertle Avenue to the north city line.

Belpre, Ohio. — The Town Council has granted to the Kanawha Traction & Electric Company a franchise to install and operate an electric light and power system in Belpre.

Elyria, Ohio.—The Cleveland, Southwestern & Columbus Railway has received a twenty-five-year extension of its franchise from the City Council of Elyria. The contract specifies eleven tickets for 50 cents and permission to extend the tracks to the factory districts.

TRACK AND ROADWAY

Visalia Electric Railroad, Exeter, Cal.—Surveys have been completed, and work will be begun at once by the Visalia Electric Railroad on its proposed extension to Lindsay. The line will enter the city limits from the south, and will use the depot and terminals of the Southern Pacific Company.

Glendale & Montrose Railway, Glendale, Cal.—A report from the Glendale & Montrose Railway states that it will probably build an extension to Sunland, 6 miles.

New York, New Haven & Hartford Railroad, Stamford, Conn.—This company has asked permission to reconstruct its eleven bridges over South Boston streets, at a cost of about $1,000,000.

St. Petersburg-Tampa Railway, St. Petersburg, Fla.—Plans for the construction of a bridge by this company across Old Tampa Bay have been approved by W. B. Ladue, United States Engineer, Jacksonville. The plans provide for three 1000-ft. openings to accommodate small boats drawing not less than 6 ft. of water, and one 5000-ft. opening to accommodate large boats. George S. Gandy, Sr., St. Petersburg, president. [Sept. 16, '16.]

Honolulu Rapid Transit & Land Company, Honolulu, Hawaii.—The board of directors of the Honolulu Rapid Transit & Land Company has authorized the construction of a new 2-mile line from Liliha Street along School Street to Kalihi Road and the sale of $400,000 stock to present stockholders to cover other minor extensions.

Pocatello Traction & Interurban Company, Pocatello, Idaho.—C. G. Haynes of Blackfoot, representing the Pocatello Traction & Interurban Company, reports the project of his company to build an electric railway north from Preston to the Yellowstone, is assured.

Chicago, Milwaukee & St. Paul Railway, Chicago, Ill.—Announcement has been made that the Chicago, Milwaukee & St. Paul Railway has added 110 miles to its electrically operated lines in Montana, extending from Deer Lodge to Alberton. It is expected that work on the fourth and last unit between Alberton, Mont., and Avery, Idaho, will be completed about the first of the year.

Elgin & Belvidere Electric Company, Chicago, Ill.—This company has sold most of the rails belonging to the Belvidere City Railway in Belvidere, and the tracks will be removed on West Lincoln Avenue from the fair grounds to State Street and on South State Street from Logan Avenue to Eighth Street. The track on State Street from the right-of-way of the Chicago & Northwestern Railroad to Harrison Street will remain intact for another year.

Galesburg Railway, Lighting & Power Company, Galesburg, Ill.—This company has opened service on the new North Seminary Street extension as far as Fremont Street.

Chicago, North Shore & Milwaukee Electric Railway, Highwood, Ill.—This company contemplates an extension of the present Libertyville and Area branch that will tap the Lake districts of the county and may ultimately proceed to Woodstock and McHenry.

Murphysboro Electric Railway, Light, Heat & Power Company, Murphysboro, Ill.—This company has purchased a large steel bridge to span the Big Muddy River, between Carbondale and Murphysboro, in connection with its proposed extension to Carbondale. The cost of the bridge was $80,000.

Cumberland Traction Company, Edmonton, Ky.—George H. Greenup, Elizabethtown, Ky., formerly general manager of the Cumberland Traction Company, recently sold at a commissioner's sale, has effected a reorganization of the company, and has bought in property rights, etc. He is making preparations to continue with construction work in the spring. [Oct. 21, '16.]

Cumberland & Westernport Electric Railway, Cumberland, Md.—This company is relocating 4000 ft. of its line to secure easier grades and improve the alignment. The work includes the construction of one steel bridge 24 ft. long and a concrete wall 700 ft. long and 7 ft. high.

Towson & Cockeysville Electric Railway, Towson, Md.—This company contemplates the construction of an extension from Timonium to Texas, Md., about 2 miles.

Northern Massachusetts Street Railway, Athol, Mass.—This company is laying new track from Central Square to the end of the line on West Main Street.

Boston (Mass.) Elevated Railway.—It is reported that an agreement has been reached whereby the Commonwealth of Massachusetts will construct a line to be used for freight service to and from the Commonwealth Fish Pier to be rented by the Boston Elevated Railway. Track construction will be begun immediately after the agreement is signed.

Springfield (Mass.) Consolidated Railway.—Work will be begun by this company on the construction of its proposed extension to Bergen Park as soon as the right-of-way can be secured and railroad crossings arranged for. The property owners along the new line have donated a fund of $2,500 to help in the construction.

City Light & Traction Company, Sedalia, Mo.—Application has been made by this company to the Public Service Commission for authority to issue $29,400 in securities to reimburse the company for betterment expenditures. Additional improvements are planned.

Trenton, Lakewood & Seacoast Railway, Trenton, N. J.—Approval has been given by the Board of Public Utility Commissioners of New Jersey to the Trenton, Lakewood & Seacoast Railway to issue $20,000 certificates of indebtedness and $19,500 of its capital stock. The application filed by the company requested that permission be given to issue $34,000 certificates of indebtedness and $26,000 of its capital stock. In approving a portion of the request the Board stated that it would approve the balance upon submission by its chief inspector of statements that expenditures covering such balance have been actually made. [March 18, '16.]

Trenton & Mercer County Traction Corporation, Trenton, N. J.—The Board of Utility Commissioners has issued two orders to the Trenton & Mercer County Traction Corporation, one requiring the company to align and resurface its tracks and put the paving in good condition between and alongside of its rails on Pennington Avenue and replace the ties there which have rotted, and one directing the company to resurface a portion of its tracks on Stuyvesant Avenue.

New York Municipal Railway, Brooklyn, N. Y.—Bids will be received by the Public Service Commission for the First District of New York, on Nov. 29, for the construction of the connecting link of the New Utrecht Avenue (West End) Line and the Culver Rapid Transit Railroad in Brooklyn. The section is to be a three-track approach to the Culver Line, about 600 ft. long, rising from the Thirty-eighth Street cut at a point where the West End Line leaves that cut, slightly west of Tenth Avenue and south of Thirty-seventh Street. The approach, beginning in open cut and curving to the northeast, rises to the elevated grade of the Culver Line at a point 371 ft. east of Tenth Avenue. The work to be done is in part open cut and in part embankment between retaining walls. The work must be prosecuted so as not to interrupt continuous train operation over the tracks of the Culver street surface railroad, which operates upon a right of way adjoining the proposed work. The work must be completed within four months of the delivery of the contract.

Southern Public Utilities Company, Charlotte, N. C.—This company is now building 2 miles of additional track in Charlotte, N. C., extending from the Morehead-South Boulevard connection with the Dilworth division toward Myers Park. The track is built on a solid concrete foundation 6 in. thick, with ties spaced 36 in. on center. Seventy-pound T rail is being used, and after the ties and rails are lined up the whole is concreted up to the surface of the rail. The surface of the concrete is floated with a wooden float to provide a wearing surface. As the concreting is being done the space between the rails and 14 in. on the outside is being paved. The remainder of the street is being paved by the property owners.

Minster & Loramie Railway, Fort Loramie, Ohio.—This company, which is operated by the Western Ohio Railroad, reports that it has under consideration an extension to Covington or Piqua, making a through line from Lima to Dayton.

Youngstown & Southern Railway, Youngstown, Ohio.—It is reported that plans are being made by the Youngstown & Southern Railway to construct a line from Columbiana to East Palestine to connect with the line of the Pittsburgh, Harmony, Butler & New Castle Railway.

Tulsa (Okla.) Traction Company.—This company reports that it will construct its extension to Sapulpa within the next six months.

Toronto (Ont.) Suburban Railway.—The Ontario Railway Board has issued an order approving the plans of the Toronto Suburban Railway for change of grade to standard, and renewal of tracks with girder rails where necessary on Dundas Street.

Southern Oregon Traction Company, Medford, Ore.—This company reports that it is building 2 miles of track.

Quebec Railway, Light & Power Company, Quebec, Que.—This company proposes to construct about 4 miles of city and suburban track during 1917.

Cleburne (Tex.) Traction Company.—Operation has been suspended by the Cleburne Traction Company owing to lack of sufficient patronage.

Dallas (Tex.) Southwestern Traction Company.—This company plans to begin construction of its proposed electric line from Dallas to Eagle Ford in the near future. Later the line will be extended to Grand Prairie and Cleburne. E. P. Turner, Dallas, president. [May 20, '16.]

Lynchburg Traction & Light Company, Lynchburg, Va.—Work has been begun by the Lynchburg Traction & Light Company double-tracking its line on Main Street.

Norfolk & Western Railway, Roanoke, Va.—This company contemplates extending electrification on its main line from Vivian to Farm, W. Va., about 11 miles; also an extension up Tug Fork branch from the junction near Welch to Wilcoe, W. Va., about 5 miles, and an extension on the Bluestone branch from Cooper to a point a mile beyond Simmons, 3 miles. Part of the construction will be done by the company's own forces and part will be done by the forces of Gibbs & Hill, electrical engineers of New York, who have been engaged to supervise the construction. With these additions the railroad will have 47 miles electrically operated.

Grays Harbor Railway & Light Company, Aberdeen, Wash.—According to reports, the Grays Harbor Railway & Light Company will call for bids at once for paving between its tracks on Riverside Avenue. If the bids submitted are not satisfactory to the company, it will do the work on its own account. The matter of paving between the tracks has been before the city commission many times during the past few months, and an ultimatum was issued recently by the city, directing that the work be started at once, or the city would barricade the tracks along the street involved.

Seattle & Rainier Valley Railway, Seattle, Wash.—It is reported that $100,000 will be expended by this company in the construction of track and paving of street intersections in the Genessee Street extension and the construction of tracks on Dearborn Street.

SHOPS AND BUILDINGS

Interborough Rapid Transit Company, New York, N. Y.—Bids will be received by the Public Service Commission for the First District of New York on Dec. 4 for the construction of station finish for nine stations on the Seventh Avenue portion of the Seventh Avenue-Lexington Avenue Line in Manhattan. The stations are located at South Ferry, Rector Street, Cortlandt Street, Chambers Street, Franklin Street, Canal Street, Houston Street, Christopher Street, and Fourteenth Street.

Rhode Island Company, Providence, R. I.—A report from the Rhode Island Company states that it expects to place contracts during the next three weeks for a new carhouse at Clyde with a capacity for forty-eight cars. The company has recently placed a contract for an addition to its Cranston carhouse.

POWER HOUSES AND SUBSTATIONS

Chicago, Ottawa & Peoria Railway, Ottawa, Ill.—This company has been rebuilding the high-tension wires extending from the power house of the Northern Illinois Light & Traction Company to Spring Valley.

Iowa Railway & Light Company, Cedar Rapids, Iowa.—This company contemplates the installation of a new 100-kw. generating unit at its Guthrie Center power plant.

Cumberland & Westernport Electric Railway, Cumberland, Md.—It is reported that two new power plants are under construction by the Cumberland & Westernport Electric Railway.

Southern Public Utilities Company, Charlotte, N. C.—A contract has been let by the Southern Public Utilities Company to W. W. Johnson, Anderson, S. C., for deepening the tail race and raising the bulkheads at the Portman Shoals hydroelectric plant owned by that company near Anderson, S. C. The deepening of the tail race is expected to increase the output at this plant, and the raising of the bulkheads will protect the power house from high water. The increase in power output is estimated at 20 per cent. The draft tubes to the five hydro-wheels are to be lengthened, as is that from the exciter turbine, and the floor of the power house is to be rebuilt of concrete, on a level 2 ft. higher than the present floor, to provide for better drainage and to escape high water. The new work will cost about $30,000.

Rhode Island Company, Providence, R. I.—This company reports that it expects to place contracts during the next three weeks for a new substation at Oakland and a new substation at Harmony. The company has recently placed a contract with the General Electric Company for equipment for two substations.

Wisconsin Valley Electric Company, Merrill, Wis.—This company reports that it is constructing a new power plant and overhead lines, changing all equipment from direct-current to alternating-current.

INDUSTRIAL NEWS

Review of Trade and Market Conditions

Rolling Stock Purchases **Business Changes** **Trade Literature**

THE PRICES OF TO-DAY AND OF TWO YEARS AGO

Statistics Are Given Showing an Increase in Many Cases of Several Hundred Per Cent—Some of the Causes Are Analyzed—The Problems of Purchasing

BY E. E. STIGALL

Purchasing Agent, Kansas City Railways Company

The prices of all materials have shown a steady advance during the past two years, and it is a wise idea to watch them closely. The ratio of present prices to the prices of two years ago is shown in Table I. This table gives the prices on materials generally used in street railway construction and maintenance, and in many instances it also shows what this increase means in dollars and cents per unit.

TABLE I—SHOWING PER CENT INCREASE IN PRICE IN TWO YEARS

Material	Requirements	Approximate Per Cent Increase in Present Price as Compared with Price of Two Years Ago
Copper	Overhead system, stations and cars.	220
Steel	Track and shops	300
Tin	Babbitt, solder, cables and overhead	110
Lead	Babbitt, solder, cables and overhead	200
Spelter	All galvanized material	200
Alloy metals	Tool steel, special work	200 to 800
Lumber	Poles, ties and shop work	125
Leather	Belting	125
Rubber	Belting, hose, insulation	110 to 125
Cotton	Fabrics, insulation, waste	130 to 150
Glass	Windows	125
Varnish	Car work	135
Paint	Cars, buildings and pole line	125
Fibre	Insulation	133⅓
Rattan	Seats and sweepers	120 to 200
Paper	Stationery and printed matter	150 to 250
Dry colors	General paint shop work	400
Linseed oil	Shop work, buildings and pole line	250
Gears and pinions	Motors and air-brake equipment	125

Deliveries for material regularly required will vary from thirty days for material in stock, to six months or one year for material from the mill, or where the material is to be manufactured according to order. In addition to the high cost of materials and the extended deliveries promised some materials have become so scarce that one is inclined to the opinion that certain species have almost become extinct.

Care must be exercised by a company in ordering material to avoid the order covering too small or too large a quantity. The temptation to buy in advance large quantities in order to prevent trouble from the stock becoming exhausted is met with the possibility of overstocking against a future decline in price. The cost of carrying stock, of course, must also be considered when large quantities are ordered. The situation can only be met by constantly watching the conditions surrounding all of the material required from month to month and following up the orders after they have been placed.

The unit prices in Table II showing change in cost of particular items will illustrate what the general condition shown above means in added costs to the street railway companies.

In view of the conditions which have surrounded the purchase of staple articles for the last two years, I presume many purchasing agents have been looking for a substitute for the word "speculation." It is apparent that the present prices are based neither on the cost of doing business nor on the intrinsic value of the materials, but are due to a heavy demand throughout the country, resulting in the general policy to charge "what the traffic will bear."

There has been considerable difficulty in obtaining paper without paying an excessive price for it, and the Federal Trade Commission has just made public the statement, following its investigation of these prices, that during one year the common stock of one of the large paper companies went from $10 to $50 a share. This same situation, of course, can be found in connection with the increased prices of other commodities.

Almost every street railway company will doubtless experience considerable difficulty in obtaining coal during the present winter. In my judgment the car shortage is due not only to the fact that the shippers and brokers are using cars for storage when they should be unloaded and released for transportation service, but this shortage has been made more acute on account of the railroads using coal cars for shipping lumber, steel products and other commodities which yield a much greater return per ton-mile than coal. The recent change in the tariff filed by the railroads to become effective on Dec. 1, providing that the demurrage charge will be increased after the first two days' free unloading time, from $1 per day as at present, to a schedule showing a $1 advance for every day a car is held should receive active support. Such a plan will tend to release cars from storage and place them again in transportation service.

TABLE II—SHOWING PRESENT PRICES AND THOSE OF TWO YEARS AGO

	Present Approximate Price	Price Two Years Ago
1 mile No. 00 trolley wire	$721.00	$327.00
1 No. 00 straight line ear	.52	.40
1 No. 00 splicing sleeve	.78	.42
1,000 ft. 9/16-in. steel span wire	35.70	19.50
1 Steel pole for line construction	36.00	27.00
100-lb. Steel bars	3.62	1.67
100-lb. Steel sheets	3.95	1.87
100-lb. Steel shafting ½-in	7.70	2.10
1 lb. High-speed tool steel	3.25	.65
1 lb. Manganese 80 per cent	.12	.02
1 Car axle	21.50	11.25
1 Boiler tube 4-in. 18-ft. No. 10	7.42	3.78
1 Manganese switch and mate	330.00	170.00
1 Overhead trolley switch	4.55	3.15
1 Air-brake equipment	230.00	170.00
1 Electrical equipment, 4 motors, 1 controller	3,250.00	2,450.00
1 10-in. valve, automatic stop	290.00	210.00
1 White oak tie	.68	.54
1 Leather belt, 2-ply, 8-in. 30-ft	46.00	34.56
100 yd. Duck, 48-in. No. 8	78.00	34.00
1 doz. Warehouse brooms	5.50	2.75
10,000 Letterheads, No. 16 bond	52.50	31.50
10,000 Yellow second sheets	9.00	3.50

It is obvious that this increased cost of doing business is being absorbed by the street railway companies and cannot be passed along to the patrons as can easily be done in practically every other business. Our terms continue to be 5 cents cash and a universal transfer throughout the system.

HIGHWAY CROSSING SIGNAL INQUIRIES NUMEROUS BUT PURCHASES ARE FEW

Orders for highway crossing signals from steam roads have been very active during the past summer. The Santa Fé road is making a large installation, and other steam roads have planned to protect all the hazardous crossings of their tracks with the Dixie and the Lincoln automobile highways. Electric railway companies have made quite a few inquiries about highway crossing signals during the summer, but no general buying has taken place. In fact, the electric roads have bought very few such signals during the past season, as compared with the purchases of previous years.

The swinging aspect or disk commonly known as the wig-wag, has met with great favor by purchasers of such signals. It has been shown conclusively to the steam roads and to a great many electric lines that a crossing warning by sound alone is not sufficiently effective, particularly on highways much traveled by automobiles. Probably the most arrestive aspect for daylight use is the wig-wag design. Some manufacturers, however, have installed with success banks of flashing lamps as a daylight warning to supplement the bell signals.

The installation of a highway crossing signal on an electric road offers a more difficult problem than it does on a steam road. The question of control, which is now obtained in numerous ways, is most important. Some signals are controlled by trolley contractors, others by short sections of third-rail, others by the depression of the running rail, and still others by track instruments. Signals of various makes are operated mechanically by springs, or by different sources of electric energy, such as primary and storage batteries, or by 600-volt current taken from the trolley wires. One manufacturer in conjunction with the engineers of an operating company has recently planned to install some highway crossing signals to be actuated by alternating current and to be controlled by alternating current devices. It is thought that by using alternating current for control and operation the reliability can be greatly increased.

FOREHANDED BUYING MEANS EFFICIENCY

James H. Drew, Indianapolis, Discusses Effects of Different Buying Methods on Manufacturer and Purchaser

In a recent interview with a representative of this paper James H. Drew, president Drew Electric & Manufacturing Company, said, in part:

"The subject of forehandedness in buying, to which the JOURNAL has been giving attention, deserves serious consideration. As the interests of supplier and user in the electric railway field are interdependent, any methods of forehanded buying are of advantage to both. If the manufacturer is able by this wiser buying to make a better product at a lower price, the railway benefits by the lower price.

"According to all indications basic materials will continue at the present high level for some time to come. The largest industrial and utility companies are buying for the second and third quarters of 1917 and even beyond. Immediate deliveries of iron and steel products are to be had only at a considerable premium, if at all. Copper base products of any magnitude are, in that respect, little better. From these conditions the lesson seems obvious, forehandedness in buying is certainly desirable.

"There is the possibility that some international complication may arise to affect our munitions export, which is generally said to be the reason for the present tremendous activity in all lines, but such complications are in nowise forecasted. If we can judge by present reasonable expectations, the war in Europe will continue for at least two more years, and war prosperity in this country will continue unabated. Such being the case the electric railways may expect to have a continued period of bounteous receipts with the attendant requirements for maintenance material and additional equipment. The demand will hold the prices up. As opposed to forehandedness in buying, hand-to-mouth purchasing will be attended no doubt by inconvenience, higher prices and disappointments in delivery.

"Of course, buying too far in advance of visible needs becomes speculation. This, however, is a charge that can hardly be laid to electric railways. Owing to the serious handicaps placed on their financial resources, most of them have not been able in the past to use that principle of forehandedness that good judgment would dictate. I believe, however, that owing to wise publicity and more open methods, the general public is coming to see less of 'horns' and more of 'halo' on the average operator, and this sentiment is bound to be reflected in business and investment circles as time goes on. With the business established as a necessary public institution, financial support will become more stable. Furthermore, a great deal of capital is coming back from abroad and will be available for an investment in American utilities. This is a subject all by itself and will not permit of discussion here. I mention it because money has to do with forehanded buying.

"Most companies, if not all, can and do know their ordinary requirements for several months or a year or two in advance, and the requisitions or estimates of any department should not be pigeonholed for any unreasonable length of time. The evil day (I say 'evil' with a manufacturer's reservation) will surely come when the trolley will wear out or break, or when a certain piece of car equipment will 'go bad,' or when more cars or power-plant equipment will be needed. The order will then have to be placed to keep the line running. Why not take the necessary steps beforehand and have the material ready? If any department is found wanting in efficient operation or economical maintenance it comes in for criticism. A year or so ago one line superintendent stated that he was maintaining his overhead lines (about 400 miles at that time) on emergency requisitions. Sometimes it was a question of 'using a club' to get the materials. This was probably an extreme case, but there are others of similar but less pronounced unforehandedness. As compared to the above example I know of one purchasing agent who saved three and one-half times his year's salary on one purchase by studying the market and buying at the lowest period of that year.

"In emergency buying there are several disadvantages. There is not time for careful consideration in order to secure the material best suited for the conditions. There is not time to get competitive prices, quality and design. The manufacturer who receives the order may have to disarrange his routine to turn out the material in the specified time, a course which will cause him or the buyer or both confusion, delay and additional expense. There is then the chance that the product may not be delivered quickly enough and that it will not be deliberately and carefully made up and inspected. Then, if defects show up in operation and cause the railway customer vexatious and expensive delay or accident he will become prejudiced against that manufacturer's goods and the latter will not only lose a customer but part of that goodwill which is so valuable to all manufacturers who have a loyal interest in the electric railway industry. Orders placed when a department is tied up usually have expensive carriage charges attached. In some instances they have to be installed on the road with overtime labor or under other circumstances which pile up the costs, directly and indirectly.

"In most sections of the country up to this time the weather has been unusually mild. As weather conditions generally average about the same during a year's period, very bad weather for electric railway operation may be expected before next summer. I dare say the transportation of coal and other heavy supplies will be seriously handicapped between now and then. There is even now a coal shortage. When bad weather does come, unless the principle of forehandedness has been applied, it will probably find many companies short of those materials such as trolley splicers, sleet cutters, spare poles, snow-fighting equipment and other materials needed to keep the lines in operation during snow and sleet storms.

"Judging, then, by present conditions, when all manufacturers are running to full capacity and with less stock than usual on hand, and with the delay in getting raw materials, it seems to me that electric railways should by all means go into this subject of forehandedness in buying now. They will thus provide the necessary material and equipment to conduct their service expeditiously and, at the same time, increase their revenues and their economy of operation. By prompt handling of their business they will also secure that other desideratum—public goodwill. By forehandedness in buying they secure the quantity price on the right material and have it when needed. As a result their property is strengthened physically and financially."

WIDESPREAD DEMAND FOR CHESTNUT POLES

"When it is considered that 3,500,000 round poles exceeding 20 ft. in length are used annually by telephone, telegraph, electric railway and light companies, we must naturally consider the future supply of the chestnut pole." This statement and the others that follow were recently made by John L. Fay, sales manager of the Paducah Pole & Timber Company, Paducah, Ky. Mr. Fay pointed out that the general tendency toward central power supply, the increased demand for efficiency and the growing cost for line materials have caused railway and lighting property operators to study carefully the ultimate cost of their transmission and distributing system. The strength of the pole line is another factor that has been prominent of late, owing to the increased need for continuity of service.

There is a large demand now, Mr. Fay says, for chestnut poles. A report made by R. S. Kellogg of the United States Department of Agriculture sets forth that 25 per cent of all the poles used by the public utility companies in the United States are chestnut poles. The pole purchasers generally are becoming better acquainted with chestnut, and this is evidenced by the fact that when Mr. Fay's company first started in business it was able to sell chestnut poles only in its own locality. However, as time has proved the comparative high strength of the chestnut pole and its great life, Mr. Fay cites that those companies which are now paying special attention to the strength of their lines have increased their demand for chestnut and the field has broadened so that it has of late been a large task to meet the requirements for supply.

With regard to the future, Mr. Fay's company has shown its faith in the possibilities for the sale of chestnut poles by acquiring, in addition to its 15,000 acres of chestnut timber, sufficient chestnut pole stumpage not only to care for the present heavy demand but for the unquestionable additional demand that will come in future years.

CLEARING-HOUSE FOR ECONOMIC INFORMATION

National Industrial Conference Board Formed to Study American Industrial Problems and Report to All Concerned

To prepare the industries of the United States for the economic changes that are to follow peace in Europe, the National Industrial Conference Board, representing the twelve most important industrial organizations in this country, has been formed. This announcement was made on Nov. 15 at the twentieth annual convention of the National Founders' Association held in New York City.

The general aims of the board, as described to the convention by Magnus W. Alexander, its manager, who is assistant to the president of the General Electric Company, include a clearing-house of economic information, a forum for constructive discussion, and machinery for co-operative action on matters that vitally affect the industrial development of the United States. Explaining in greater detail, he said: "The essential point is the purpose of the conference board to study every problem and its development, to resolve it, if possible, into its essential facts for the information of the public, of government, of labor and all the members of the various associations represented in the board." The new organization, it was stated, would seek to influence legislation only by the presentation of facts and arguments carefully studied and of a character leaving no doubt as to their accuracy.

The twelve industrial organizations forming the conference board comprise 15,000 employers, who furnish industrial employment to about 7,000,000 workers in the United States. Frederick P. Fish of Fish, Richardson, Herrick & Neave, attorneys, is chairman of the board. The membership of the board as announced included the National Founders' Association, National Metal Trades Association, National Council for Industrial Defense, National Association of Manufacturers, National Erectors' Association, National Association of Cotton Manufacturers, American Cotton Manufacturers' Association, National Association of Wool Manufacturers, Silk Association of America, United Typothetae and Franklin Clubs of America, American Paper & Pulp Association, and the Rubber Club of America.

In discussing at the convention the subject, "How Shall Manufacturers Contribute to American Industrial Progress?" E. W. Rice, Jr., president General Electric Company, predicted that troubles will begin in this country when the war ends. He continued: "One of the most interesting industrial problems awaiting a satisfactory solution is that of real co-operation among the men and women engaged in industry. The lack of understanding and confidence is largely due to lack of knowledge of each other, and this knowledge is lacking in the manufacturer as well as in the wage earner."

At the annual banquet of the National Founders' Association on the evening of Nov. 15, Mr. Fish, chairman of the new conference board, said in the course of an address on "Industrial Co-operation": "During the next ten years the United States will be confronted by new and complex problems in industry and finance. It is impossible to predict how serious these problems may be, but it is safe to say that the only way to meet them is by a knowledge as perfect as possible of the fundamental facts and causes existing in the situation. It is necessary at the outset to know precisely the condition of things as they are to-day, to understand the various elements entering into our manufacturing industry, and to analyze and study all the points which go to make for a prosperous manufacturing industry."

STEEL RAILS AND COPPER TAKE BIG JUMP

United States Steel Corporation Announces Advance in Steel Rails of $5 a Ton—Copper Reaches Highest Point of Year

An advance in standard steel rails of $5 per gross ton has just been announced by the United States Steel Corporation, this being the second advance since the first of the year. The increase, which is effective immediately, makes Bessemer rails $38 and open hearth $40 a ton f.o.b. Pittsburgh, Pa.

Angle bars and fish plates also advanced $5 a ton and wrought-iron pipe advanced $2 a ton.

On Tuesday of this week the price of electrolytic copper had advanced to 32.5 cents nominal for prompt delivery. The advance during the week was 2.75 cents. Prices of copper, which have been advancing daily for the past ten days, are making new high records for the year. Prompt secondhand copper was offered early in the week at 33 cents, 32 cents bid. Already bids have been made for first quarter delivery at 30.5 cents, with 31 cents asked. For the second, third and fourth quarters the metal is being held for 30.5, 29.5 and 29 cents, respectively.

So great has been the demand both for European and domestic consumption that even at these greatly inflated prices there is but a small percentage of 1917 production remaining unsold.

NEW INTERESTS IN THE HESS-BRIGHT MANUFACTURING COMPANY

To correct misleading rumors, the Hess-Bright Manufacturing Company, Philadelphia, Pa., announces that a group of bankers, including Frank A. Vanderlip, Philip W. Henry, Thatcher M. Brown and Franklin B. Kirkbride, of New York, and Marcus Wallenberg of Stockholm, have recently acquired from the American group of stockholders a controlling interest in the shares of the Hess-Bright Manufacturing Company. This group of bankers owns also a substantial interest in the S. K. F. Ball Bearing Company of Hartford, Conn.

The two companies will be operated quite independently of each other. The former policy of the Hess-Bright Manufacturing Company will be continued, except that its manufacturing facilities will be increased somewhat more rapidly to meet the constantly growing demand for its product. B. D. Gray, who retains his former stock holdings, will continue to manage the business as president. F. E. Bright retires from active participation in the company's affairs, but remains identified with the company as chairman of the board. Aside from these two changes the organization remains as before.

The directors are: F. E. Bright, chairman; B. D. Gray, president of the Hess-Bright Manufacturing Company; Willard Parker Butler, New York; Arthur V. Morton, vice-president of the Pennsylvania Company for Insurance of Lives and Granting Annuities, of Philadelphia; and Paul von Gontard, managing director of the Deutsch Waffen und Munitions Fabriken, Berlin, Germany.

COMMISSION TO STUDY LUMBER MARKET ABROAD

A commission to be financed jointly by the government and by the lumber interests will shortly be appointed for the purpose of studying the lumber markets abroad. The members of this commission will be experienced in timber production, manufacture of forest products and marketing forest products and will visit all the important European countries.

ROLLING STOCK

Seattle & Rainier Valley Railway, Seattle, Wash., are in the market for a one-man car.

Seattle & Rainier Valley Railway, Seattle, Wash., are in the market for thirty fare boxes.

Monroe Street Railway, Monroe, La., is reported to be in the market for three new street cars of the latest design.

Detroit (Mich.) United Railway is purchasing fifty trail cars and may buy several interurbans within the near future.

Chicago, South Bend & Northern Indiana Railway, South Bend, Ind., has ordered five city cars from the St. Louis Car Company.

Grand Rapids, Grand Haven & Muskegon Railway, Grand Rapids, Mich., will shortly purchase two passenger and two express interurbans.

Chicago (Ill.) Surface Lines have ordered ten city cars from the American Car Company, St. Louis. These cars will conform to the design of the last order for 228 cars.

Hydro-Electric Power Commission, Toronto, Ont., has ordered two interurban cars from the Jewett Car Company for the London & Port Stanley Railway.

Lake Shore Electric Railway, Cleveland, Ohio, noted in the ELECTRIC RAILWAY JOURNAL of Oct. 21, 1916, as being in the market for fifteen 60-ft. motor cars, is said to be considering the purchase of sixteen trail cars.

Mason City & Clear Lake Railroad, Mason City, Iowa, is contemplating the purchase of two one-man cars for city service and also two electric locomotives for handling freight on their proposed belt line around Mason City.

Hodenpyl, Hardy & Company, New York, N. Y., and **E. W. Clark & Company, Philadelphia, Pa.**, are reported to be considering the purchase of at least sixty city cars and twenty interurban cars to be used by the Michigan Railway Company and the Northern Ohio Traction & Light Company.

Southern Public Utilities Company, Charlotte, N. C., has ordered six double-truck cars from the Southern Car Company of High Point, N. C., for use on the Charlotte system. These cars are to be similar in every respect to the six purchased from the same company in the spring of 1915, and will become a part of what is known as the "70 series." They are to be 38 ft. 2 in. long, 8 ft. and 7½ in. wide. They will be equipped with two 750-volt motors, maximum traction trucks, air brakes, 750-volt air compressor, electric heaters and ventilators, Ohmer fare registers, inclosed vestibules with folding doors and step, and projecting type fenders.

TRADE NOTES

Perry Ventilator Corporation, New Bedford, Mass., has received an order to equip with ventilators the fifty cars being built by the Laconia Car Company for the Boston Elevated Railway.

Lord Manufacturing Company, New York, N. Y., has received an order for 100 Horne double-acting brakes for the fifty surface cars being built by the J. G. Brill Company for the Boston Elevated Railway.

Sherwin-Williams Company, Cleveland, Ohio, manufacturer of paints and colors, celebrated its jubilee anniversary this week at the Hotel Statler, Cleveland, Ohio, at which salesmen, agents and representatives from all parts of the world were present.

Westinghouse Electric & Manufacturing Company, Westinghouse Lamp Company and R. B. Nuttall Company, announce the removal of their San Francisco offices to the seventh floor of the First National Bank Building, 1 Montgomery Street.

Vaughn, Meyer & Sweet, Consulting Engineers, Majestic Building, Milwaukee, Wis., have recently changed their organization, returning to the original firm name of Vaughn & Meyer, after the recent dissolution and the withdrawal from the firm of Arthur J. Sweet. F. A. Vaughn and H. J. Meyer will continue to conduct the same engineering activities with their present organization as they have been doing for years past.

Westinghouse Air Brake Company, Pittsburgh, Pa., at its last annual meeting created the position of chairman of the board and H. H. Westinghouse was elected to that office. John F. Miller, who has been vice-president of the company since 1905, was elected to the office of president. A. L. Humphrey was made first vice-president and general manager. Charles A. Rowman, heretofore auditor, was promoted to the position of comptroller, and John T. Eichner, formerly assistant auditor, was made auditor.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., reports the receipt of a contract from the New York Connecting Railways, New York, N. Y., for all the catenary hangers used in its construction. It has also received an order from the Pittsburgh (Pa.) Railways for 25,000 2/0 15 in. bronze trolley ears and an order from the Timber Butte Milling Company, Butte, Mont., for a 60-ton, double-truck locomotive, equipped with four 600-volt motors and HL control. This locomotive will have single end straight automatic air brake equipment and a pantograph trolley.

C. S. Hawley has resigned as president of the Laconia Car Company and of the Consolidated Car Heating Company to accept the position of treasurer of the Remington Arms-Union Metallic Cartridge Company, Bridgeport, Conn. Mr. Hawley, who was elected president of the Consolidated Car Company in 1909, left to become president of the Laconia Car Company in 1912. He again became president of the Consolidated Car Heating Company in 1916. Mr. Hawley has also taken an active part in the affairs of the American Electric Railway Manufacturers' Association, serving as a member of the executive committee from 1908 to 1912, as chairman of the finance committee in 1908, as vice-president from 1909 to 1912, and as president of the association from 1913 to 1914. No successor to Mr. Hawley has been named in either of the two companies above mentioned.

ADVERTISING LITERATURE

Chicago Pneumatic Tool Company, Chicago, Ill., has issued bulletin 34-X on its Giant gas engine. This is a horizontal, straight-line type engine with crosshead, and two stroke cycle operation, built as a single cylinder machine in sizes from 16 to 110 hp. and as a duplex machine from 70 to 220 hp.

Peter Smith Heater Company, Detroit, Mich., has just issued bulletin No. 8 on forced-ventilation electric heaters. In this 20-page bulletin are shown schematic diagrams of this type of heater, illustrations of the heater and blower, motor fan and of a forced-ventilation electric heater and control installed on a city car.

Electric Railway Improvement Company, Cleveland, Ohio, has issued a thirty-two page booklet on the early history and present facts regarding the installation of rail bonds by electric and copper welding. This booklet illustrates and describes the different types of electric weld bonds for the different types of rails.

Holden & White, Chicago, Ill., general sales agents for the Garland Ventilator Company, have issued a comprehensive catalog on car ventilators and ventilating systems. It first deals with the ventilating problem from the viewpoint of the transportation department, because car ventilation is of prime importance to successful passenger service. This catalog describes the condition which must be overcome in order to give a properly ventilated car, and shows why the ordinary deck sash is ineffective. For the mechanical department, a complete description is given of twelve types of car ventilators, including those for city, suburban and interurban cars, both monitor and arch-roof types. Among these is a ventilator for use in combination with lighting fixtures, a combination intake and exhaust ventilator, two types of intake ventilators, and two of forced ventilation. The importance of cowls is emphasized by illustrations to show the action of the air currents induced by these cowls. An interesting chapter describes the ventilators in tests, and shows the volume of air passing through the ventilators in cubic feet per hour, both tabulated and in chart form. A comparison of these ventilators with other ventilators is also graphically illustrated. Considerable space is given to the following subjects: Intake and exhaust; intakes; circulating or balanced ventilation; Garland forced ventilation. All of these subjects are of particular importance at the present time. A chapter is devoted to this company's honeycomb ventilator for carhouses and power houses.

Within Sound of the Bell

In those dear old Hibernian days before the efficiency engineer darkened the land, one unit of distance was "as far as the sound of the bell or the crow of the cock."

That "sound of the bell" has a familiar ring to us.

The old idea about safety for the man in the street was to sound the bell or gong and trust to luck that he would skip aside before he was struck.

Modern safety ideas and many a court decision have put it up to the car to stop short whether the pedestrian gets out of the way or not.

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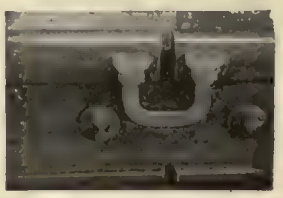
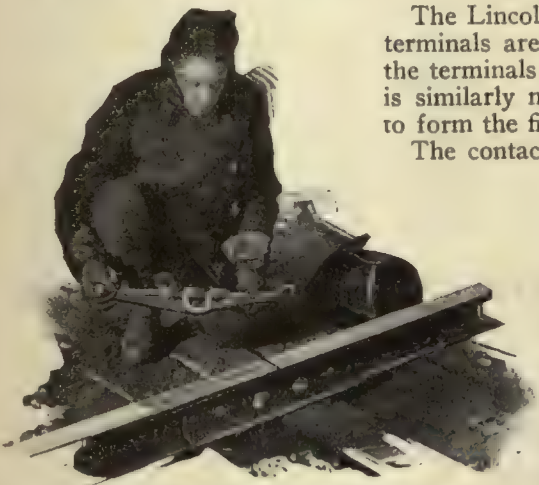
An Indestructible Union Between Bond and Rail

—that is the ideal in rail-bonding practice—an ideal that is realized when the bonds are applied by the



Lincoln Bond welded to ball of rail

Lincoln Bonding System



Mold for attaching Lincoln Bond

The Lincoln Bond is U-shaped, and formed of flat copper strips. The terminals are clamped to the rail, and an electric arc is then drawn to the terminals until they are molten—after which a small area of the rail is similarly melted and new copper is deposited in the molten mixture to form the finished terminal.

The contact between bond and rail is extremely strong, both mechanically and electrically, because there is an actual flow of the copper into the steel, and of the steel into the copper, at the bond-head.

For your profit's sake, investigate the Lincoln System.

The Lincoln Bonding Company
636 Huron Road, Cleveland, Ohio

AGENTS:
LEWIS & ROTH COMPANY, 311 Denckla Bldg., Philadelphia, Pa.
114 Liberty Street, New York City, N. Y.
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Electrical, Photometrical and Mechanical Testing.
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ROOSEVELT & THOMPSON
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Report, Investigate, Appraise, Manage Electric Railway, Light and Power Properties.

IT IS A PAYING INVESTMENT
to carry an advertisement in the ELECTRIC RAILWAY JOURNAL every week in the year.

A Word to Employers

You can secure just the man you desire to strengthen your organization by placing an advertisement in the Searchlight Section of the

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This paper is read by progressive men, many of whom are ambitious for better positions than they now have. They study our "Positions Vacant" columns each week for opportunities for advancement.

You can get in touch with a number of these competent men and select the one best fitted for your needs, by stating in an advertisement in our Searchlight Section the experience and qualifications you require and telling what you have to offer. The cost will be only 3 cents a word, minimum charge $1.50 an insertion.

We suggest that you use in the advertisement either your own name, that of one of your employees, or a local post office box number or street address, so that the replies (letters and telegrams) will come direct to you. If you prefer to have the replies addressed to a box number in one of our offices, they will be enclosed in new envelopes and remailed to you promptly each day.

Hundreds of prominent employers now use this method of securing the men needed in their organizations. May we not help you also?

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Cross Ties

Steel Ties are making steady progress in displacing wood ties. There are several reasons for this:

1st.—The life of one steel tie is about equivalent to that of three wood ties.

2nd.—Owing to the longer life of steel ties there is a saving in labor cost equal to the difference in cost of removing and installing one steel tie and three wood ties.

3rd.—At the end of their serviceability steel ties have a scrap value of approximately one-third of their original cost.

The mark of quality CARNEGIE It protects the user

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West Allis Works.
Minneapolis, Minn.
New Orleans, La.
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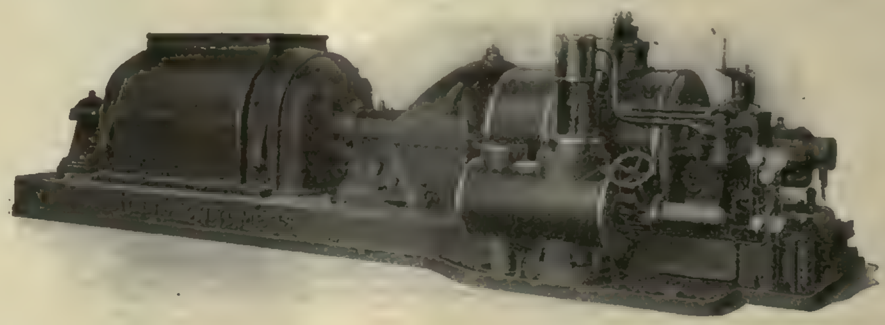
Allis-Chalmers Parsons Steam Turbines

Show sustained economy after years of operation
Units built in sizes from 200 K.W. up

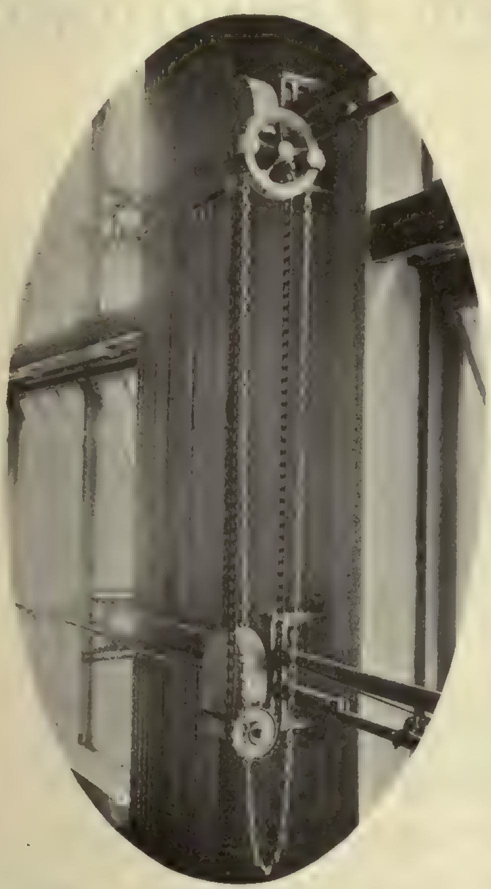


3200 KW., Max. 3600 R.P.M., H. P. Condensing Steam Turbine and Alternator. Unit of this size installed in the plant of the Eastern Pennsylvania Ry. Co., Palo Alto, Pa.

Allis-Chalmers Manufacturing Co.

Milwaukee, Wis.

For all Canadian Business refer to Canadian Allis-Chalmers, Ltd., Toronto, Ont., Canada



Havana Electric Railway
Light & Power Co.

has equipped its new power plant in Havana entirely with

Drouvé Sash Operators
(Lovell Improved Dreadnaught Type)

—about 10,000 lineal feet, both monitors and side-walls. This is only one of many large electric railways that has investigated, compared, chosen and specified Drouvé Sash Operators—both Lovell and "Straight-Push" types. Simple, strong and sturdy. Practical and permanent. "Built to stand the kind of use they get."

Send for list of installations

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When you receive the liberal gallon sample which we'll gladly send you for test, give it a "man's size" trial—put it on the job. Let actual service, under your own particular operating conditions, show you that

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will withstand high temperatures—that it *is* oil-proof and water-proof—that it *does* dry with remarkable rapidity—that it is just the insulating varnish you have been looking for.

Simply say to us, "Send along that gallon can of 'Chinalak' and we'll give it a fair trial under our usual conditions—use your business letterhead, and tell us whether we shall send the clear or the black 'Chinalak.'" Remember that

A Trial Gallon of "Chinalak" Is Yours for the Asking

—You put yourself under no obligation whatever—for there are no strings attached to this trial offer. Write today for your test sample—get acquainted with "Chinalak."

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The Insulation Specialists
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Complete Machinery Equipment

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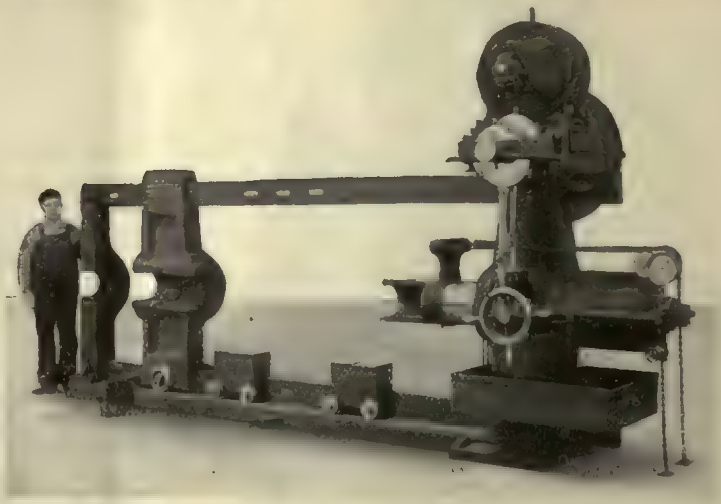
Full line of high grade machines for the special requirements of such shops, as well as all types of standard machine tools, steam hammers and electric traveling cranes.



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48" 300 and 400 ton presses are built with cast steel cylinders and resistance posts to enable them to withstand great pressures. Hence wheels can be kept very tight on axles and yet removed and forced on again quickly. Our presses are built throughout with the same care and precision used in making our high grade machine tools.

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Why not guard your equipment against attack? An easy and quick way to fortify is to specify any of our

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Protection where high voltage wires interlace requires extra defensive measures

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From 5 to 40 per cent Less Metal is Needed

to fill a bearing with

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A BABBITT METAL WITHOUT A SUCCESSFUL RIVAL FROM 1870 TO THE PRESENT TIME
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Hardy's SS Metal

than with other bearing alloys. It is the lightest of any known anti-friction metal, having a specific gravity of only 7.32.

Its melting temperature is 316°C. or 600°F—is fluid, and in condition to pour well at 454°C or 850°F.

It will not cut or score the shaft under any circumstances—runs cool under pressure that would crush many anti-friction metals. That is why so many electric railways have adopted it as standard for armature and axle bearings.

William A. Hardy & Sons Company

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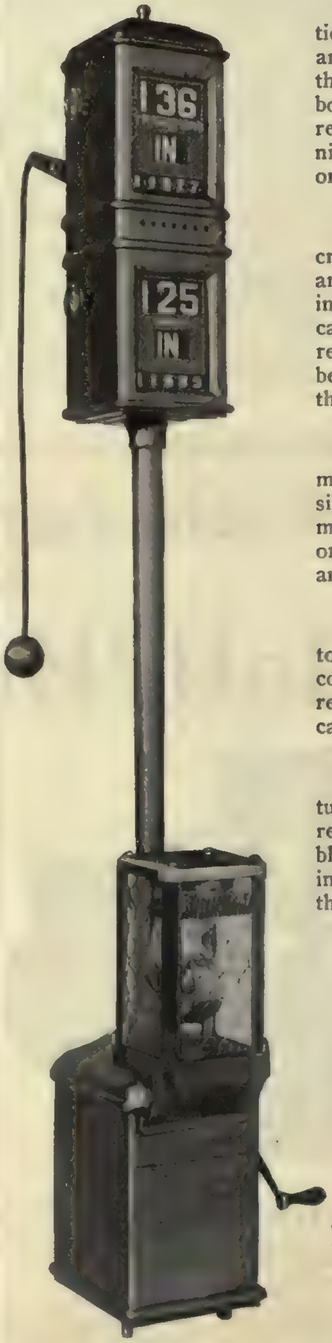
International C21

A Hand-Operated Combination Coin and Transfer Register for Single-End and Center-Entrance Cars



This compact combination replaces in single-end and center-entrance cars the use of separate fare boxes, car registers and register-operating mechanism, whether cords, rods or pedals and levers.

The same turn of the crank that counts in dollars and cents the cash deposited in the box also counts this cash in full fares on the register. There's no slip between the cup (box) and the lip (register)!

The conductor's work is made as simple as is possible in a hand-operated mechanism. He can't get one reading on the box and another on the register.

And the only cord he has to pull is the one that is connected to the transfer register directly over the cash register.

No aching shoulders from tugging frequently at high register cords, and no troubles due to passengers giving a stop signal by way of the register mechanism!

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Nuttall - - - Pittsburgh

No Pigtails Needed

with the

Lindall Brush Holder

because its springs and contacts have ample capacity to take care of all the current. But this feature, though a big one, is only one of several.

For instance, recessing of brushes is eliminated; there are no screws or nuts to loosen and cause trouble; no parts to be adjusted after installation. Firm, even brush-contact is positively assured, and quick renewal or inspection of brushes is easy. Get in touch with our nearest office.

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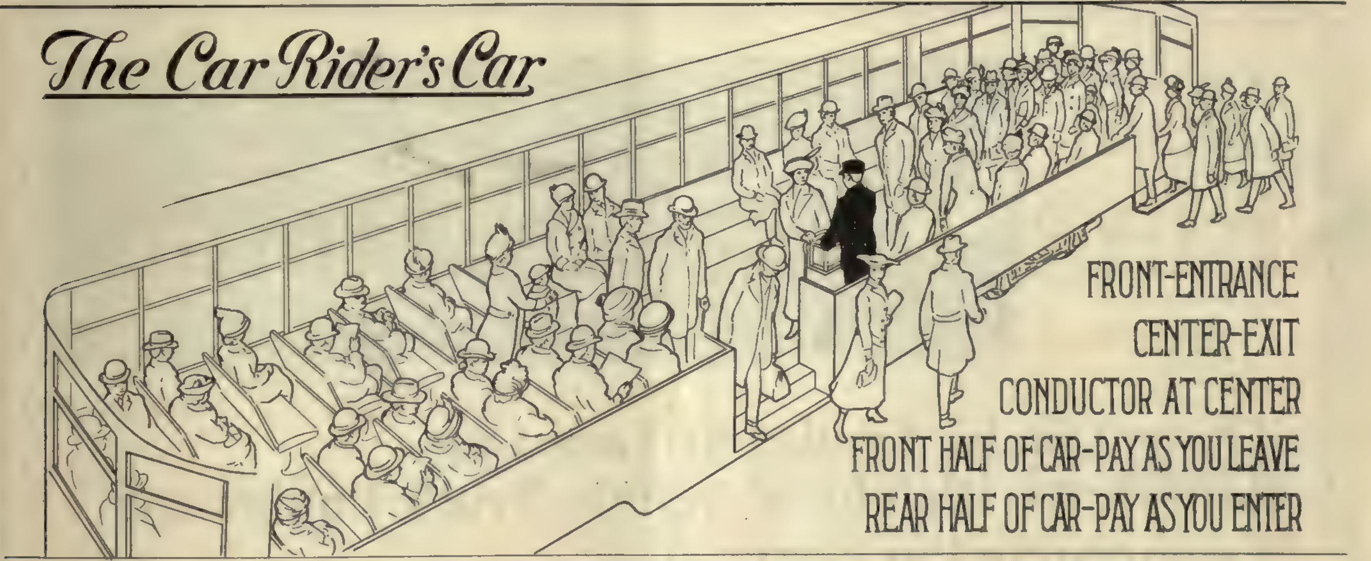
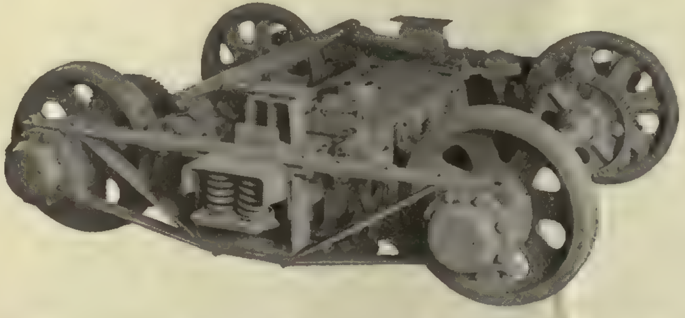
The Car Rider's Car


FRONT-ENTRANCE
CENTER-EXIT
CONDUCTOR AT CENTER
FRONT HALF OF CAR-PAY AS YOU LEAVE
REAR HALF OF CAR-PAY AS YOU ENTER

THIS picture of a Car Rider's Car—with the roof and part of the side omitted—shows how passengers can flock aboard at a transfer point, because there is no fare collecting at or near the entrance to hold them up. And while passengers are entering at the front others are leaving at the side—there can be no conflicting movement. The conductor collects fares as passengers pass him at the center of the car either on leaving (from the front section) or on going to the rear. The conductor operates sliding doors at the exit and the motorman operates folding doors and step at the entrance. Very complete information on all particulars will be sent on request.

PETER WITT, 630 Leader Building, CLEVELAND

CITY SERVICE TRUCKS



Baldwin Truck, Class 66-18-C. Built for New York State Rys., Syracuse Lines

The arch bar type of truck, because of its strength, light weight and compact design, is specially suitable for the severe requirements of city service. In the truck shown, the bolster is formed of a piece of flanged steel plate, and is supported on a combination of half-elliptic and coil springs. Note the non-chattering brake-work, with parts bolted together. The bolts are fitted with castellated nuts, so that they cannot work loose and allow the brake rigging to drop on the track.

Let us recommend truck designs suitable for service on your road.

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that of maximum traction cars twelve per cent and make the single truckers ride like Pullmans.

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THIS TRUCK REMOVES THE LAST OBJECTIONS.

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They represent high standards of workmanship combined with most modern construction.

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Western **"Good Poles Quick"** Northern
Quick Shipments from our Minneapolis Yard
Rooms 832-834, 72 West Adams St., Chicago, Ill.
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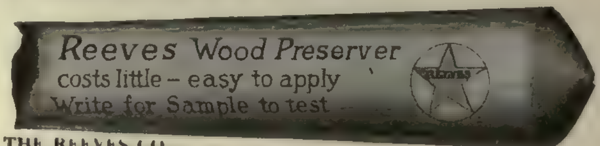
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Strongest STEEL POLE of like weight in the world.
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Most artistic STEEL POLE in the world for any service.
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We have constantly on hand about two thousand tons of steel and can make immediate shipments.
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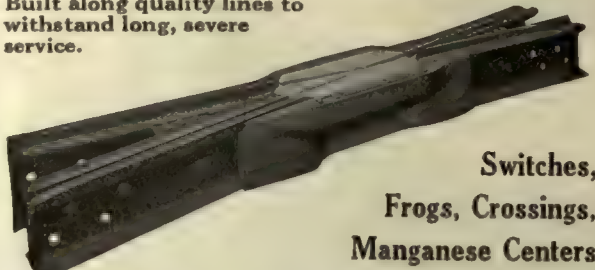

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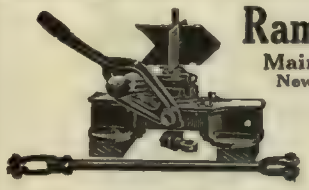

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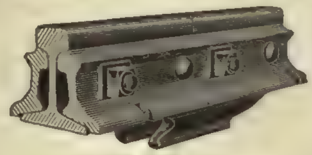

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MURPHY IRON WORKS Detroit, Mich. U.S.A.

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CIRCUIT I-T-E BREAKERS

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Circuit Breakers

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If you work around electrical machinery, and need correct time, you **must have an absolutely dependable watch.** Here is the one watch an electrician can count on and the active business man cannot afford to do without—**the one Thos. A. Edison carries—the**

PAILLARD NON-MAGNETIC WATCH

Accurate near dynamos—unaffected by extreme heat or cold—a watch to rely upon and be proud of for years and years. **Fully Guaranteed.**

Write at once for wonderfully interesting FREE Booklet, price list, and remarkable testimonials from leaders in scientific and electrical fields.

GEORGE E. MARSHALL
31 N. State St. Dept. 6 **Chicago**

The Acetylene Blow Torch
Prest-O-Torch

Quicker and cheaper than a gasoline blow-torch for brazing and soldering

For factories, repair shops, linemen, dentists, jewelers, the Prest-O-Torch saves time and money. Used with Prest-O-Lite Tanks—ready made gas. Intense, concentrated flame instantly lighted. No depreciation, safe and convenient. Style "A," price, 75c (Canada, 85c) will braze up to ⅜ inch round rod. Style "C" for heavier work, $2.25 (Canada, $2.75). Special styles for dentists. Write for literature or send order now. Money refunded if not satisfied.

The Prest-O-Lite Co., Inc. 805 Speedway Indianapolis, Ind.
Canadian Main Office and Factory, Merritton, Ont.

Packard Transformers
Are Always Quality Transformers

Every transformer from the smallest to the largest, is made from the highest grade material obtainable and is guaranteed to give maximum service, as near to perfect service as it is possible to give. Packard deliveries are always prompt, too.
Write for Transformer Bulletin E.R.J. It contains a mint of valuable information.

The Packard Electric Company WARREN, OHIO

SALES OFFICES
Electric Appliance Co., Chicago, Dallas, New Orleans and San Francisco; Post Glover Electric Company, Cincinnati, Ohio; H. I. Sackett Electric Company, Buffalo, N. Y.; Electric Service Supplies Co., Philadelphia, New York and Boston; Braid Electric Co., Nashville, Tenn.; N. L. Walker, Raleigh, N. C.

Full Power with High or Lower Adjustment

Many emergencies requiring a powerful jack present a difficulty in bringing the jack to bear on the load. The

Buckeye Emergency Jack No. 239 Special

saves time, strength and trouble. The many positions to which it is adjustable easily solve perplexing lifting problems. Full details in our catalog. Write for it.

The Buckeye Jack Mfg. Co.
Alliance, Ohio

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co.
Ansonia, **Connecticut**

P & B Insulation

guarantees good electrical service. Electric railway men have been buying P & B Products for 32 years—good evidence of quality.

P & B

Weatherproof Tape
Insulating Compound
Baking Varnishes
Air-Drying Varnishes
Solid Compounds

Write for Booklets

The Standard Paint Company
Woolworth Building, New York
Boston Chicago Denver

STERLING
Insulating Varnishes
and Compounds
HIGHEST GRADE STANDARD OF QUALITY

Clear and Black Air Drying Insulating Varnishes
Clear and Black Baking Insulating Varnishes
Oil Proof Finishing Varnishes
Impregnating Compounds
Wire Enamels

FOR THE MANUFACTURER—OPERATOR—REPAIRER

Inquiries invited. Catalogue on request.
We gladly assist in selection.

THE STERLING VARNISH COMPANY
PITTSBURGH, PENNA.
Manchester, England

OHMLAC
HYDROCARBON PRESERVATIVE PAINTS AND COMPOUNDS
OHMLAC
MFG CO

The PURCHASE of equipment calls for the best of engineering brains.

The PRESERVATION of the same equipment is frequently left to chance.

We can show you how to preserve your equipment by proper painting.

The best preservative against rust, moisture, acids, alkalies, sulphur and electrolysis.

Write for full Information

UNION INSULATING CO.
Sole Agents and Distributers
Great Northern Bldg., CHICAGO

Keep a good commutator in condition for maximum service by using

DIXON'S Graphite Brushes

Booklet 108M free upon request

Joseph Dixon Crucible Co., Jersey City, N. J.
M-18

FORD TRIBLOC

A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only Block that carries a five-year guarantee.

FORD CHAIN BLOCK & MFG. CO.
142 Oxford Street, Philadelphia

Oxweld Acetylene Co.

Largest Makers of Oxy-Acetylene Welding and Cutting Equipment in the World.

Originators of the Oxweld Process

Full information on all classes of Welding and Cutting will be sent on request.

Oxweld Acetylene Company
CHICAGO, ILL. NEWARK, N. J.

The Big Three
D & W Fuses, Deltabeston Wire
Delta Tape
D & W Fuse Co., Providence, R. I.

KINNEAR Steel Rolling Doors
FOR CAR HOUSES

Compact, Durable, Easily and Speedily Operated and Fireproof. Openings of any size may be equipped and the doors motor-operated if desired. Manufactured by the
KINNEAR MANUFACTURING CO., Columbus, Ohio
BOSTON PHILADELPHIA CHICAGO

WATER SOFTENING OR FILTRATION
FOR BOILER FEED AND ALL INDUSTRIAL USES
WM. B. SCAIFE & SONS CO. PITTSBURGH, PA.

INSULATING TAPE
of
Quality
STANDARD
Woven Fabric Co
Walpole, Mass.

It Saves Current: and Keeps the Passengers Comfortable

because it automatically holds car-temperature at a predetermined point.

The Consolidated System of Thermostatic Regulation

switches the heaters into circuit when the temperature falls too low—and cuts them out when the car becomes too warm.

Proper car-temperature is too important a matter to be left to conductors—put it up to the Consolidated System.

Write for Bulletin No. 13-A

Consolidated Car-Heating Co.
New York Albany Chicago

PANTASOTE

The National Standard
for Car Curtains and
Car Upholstery

AGASOTE HEADLINING

The only headlining made in one solid piece. Will not separate, warp or blister. Waterproof and homogeneous.

The Pantasote Company
11 Broadway, New York People's Gas Bldg., Chicago, Ill.
797 Monadnock Bldg., San Francisco, Cal.

Cleveland Fare Boxes

Cleveland Fare Box Co.
5318 St. Clair Avenue
Cleveland, Ohio

WE CAN CUT YOUR COST OF HEATING CURRENT
WRITE FOR THERMOSTATIC CONTROL INFORMATION

GOLD

- ELECTRIC HEATERS Cut Installation and Maintenance Charge.
- VENTILATORS Also Ventilate in Stormy Weather.
- THERMOSTATS Save Current.
- ORIGINATED the use of NON-CORROSIVE Wire for Electric Car Heaters.
- ORIGINATED The Ventilated Coil Support.

LET US FIGURE ON YOUR NEXT REQUIREMENTS

Gold Car Heating & Lighting Co., 17 Battery Pl., New York

Johnson Registering Fare Boxes

used in connection with the car register increase receipts $1.00 per car, per day, counts metal tickets the same as cash thus giving a positive check on all class of fares.

WRITE FOR NEW BOOKLET

JOHNSON FARE BOX COMPANY
Jackson Blvd. & Robey St. Chicago, Ill.
U. S. Metal & Manufacturing Co. 165 Broadway, New York City, N.Y.

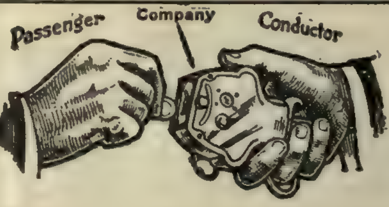
RAILWAY UTILITY CO.
Sole Manufacturers
"Honeycomb" and "Round Jet" Ventilators
for Monitor and Arch Roof Cars, and all classes of buildings; also
Electric Thermometer Control
of Car Temperatures.
721 W. FULTON ST. Chicago, Ill.
Write for Catalogue
1328 BROADWAY New York, N.Y.

For the Answer to your Fare Collection Problems
Write for
"Earnings Per Passenger Mile"
It tells how the
BONHAM TRAFFIC RECORDER
Will Meet Your Needs
The Bonham Recorder Co., Hamilton, Ohio

ELECTRIC RAILWAY DEVICES

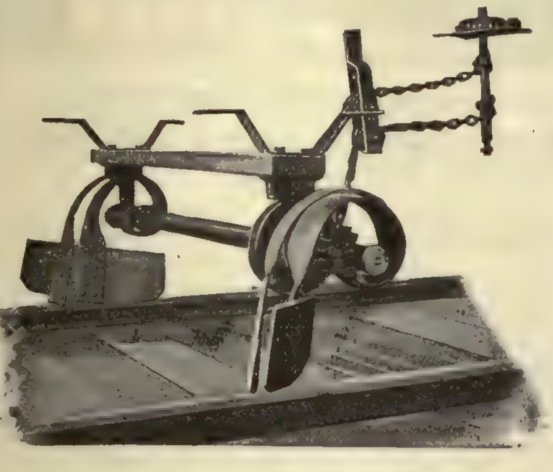
Rectifier for Frozen Air Pipes.
High Power Compact Hand Brakes, Gear or Differential Types.
Sterling Light Weight Roller Bearing Trolley Bases.
Screenless Air Cleaners for Compressors
Sterling Sand Boxes.
Berg Fenders and Wheel Guards.
Multi-Vapo-Gap Lightning. Arresters and Hydrogrounds.
Trigger Lock Reversible Controller Fingers.
"Q-P" Trolley Catchers.
Soldered Rail Bonds.
Friction and Insulating Tapes.
Sterling Ticket Punches.
Controller Handles.

LORD MFG. CO.,
105 W. 40th St., New York



Direct Automatic Registration By the Passenger

Rooke Automatic Register Co.
Providence, R. I.



Keep your Road Open

during winter's storms, by equipping every car with

Root Scrapers

They can be applied to any type of car, and are the right equipment for all conditions of service.

Scrapes out the groove, cleans the rail and road nine inches on both sides of each rail.

Nearly 15,000 now in use on 1000 roads.

Write for particulars and prices.

The Root Spring Scraper Co., KALAMAZOO MICHIGAN

The Proof

of the absolute value of "Bound Brook" Trolley Wheel Bushings, is easily seen in their rapidly-increasing sales. Last year, over two million—this year, *already* crowding last year's record.

All genuine graphited "Oil-Less" Bearings have always been made at Bound Brook, N. J., in the United States of America, by the

Bound Brook Oil-less Bearing Co.

FORMERLY

Graphite Lubricating Company

MASON SAFETY TREADS—prevent slipping and thus obviate damage suits.

KARBOLITH CAR FLOORING—for steel cars is sanitary, fireproof and light in weight.

STANWOOD STEPS—are non-slipping and self-cleaning.

Above products are used on all leading Railroads. For details address

AMERICAN MASON SAFETY TREAD CO.

Main Offices: Lowell, Mass.

Branch Offices: Boston, New York City, Chicago, Philadelphia, Kansas City, Cleveland, St. Louis.

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.

THE STAR BRASS WORKS

KALAMAZOO, MICH., U. S. A.

The Standard for Speed, Accuracy, Durability

B-V Visible Punch

Look for this

B-V.

Trade Mark

Bonney-Vehslage
Tool Company
124 Chambers Street
New York City

Factory
Newark, N. J.

Big Results from Little Ads

The advertisements in the Searchlight Section are constantly bringing together those who buy, sell, rent or exchange.

They convert idle commodities into useful cash, idle cash into useful commodities, and that which you have but don't want into that which you want but don't have.

The cost is a trifle, the results considerable.

Get Your Wants into the Searchlight

The Best Shade Rollers for Cars

SPECIAL shade rollers for cars, that will last and give satisfaction for years, and yet cost but little more than the poorest you can buy, are made by the Stewart Hartshorn Co., E. Newark, N. J. This company is by far the largest shade roller manufacturer in the world. It is able to give high quality at lower prices because of the enormous output. Write for catalog, stating wants. You are always protected when you buy shade rollers if they bear the signature

Stewart Hartshorn

Have you our new

Trolley Wheel Bulletin

Write for your copy

The Eureka Company North East, Pa.

Ventilation—Sanitation—Economy—Safety

All Combined in,

THE COOPER FORCED VENTILATION HOT AIR HEATER

Patented September 30, 1913. Ask for the full story.

We Also Manufacture Pressed Steel Hot Water Heaters

THE COOPER HEATER CO., CARLISLE, PA.

SEARCHLIGHT SECTION

600 Kilowatt 60 Cycle Rotary Converter

We offer for immediate shipment 1 600 KW. Westinghouse Rotary Converter for Railway work. 3 ph., 60 cy., 370 v. A.C., 575 v. D.C., speed 600 rpm.

We also have the following transformers that will be sold with or without the above rotary as might be desired:

4—125 KW. Westinghouse oil cooled transformers, 15,000 v. primary, 370 v. secondary.

200 Kilowatt 60 Cycle Rotary Converters

2—200 KW. Westinghouse, 3 ph., 60 cy. rotary converters, 370 v. A. C., 575 v. D. C., 720 rpm., with starting motors, also transformers if desired.

150 Kilowatt 60 Cycle Rotary Converters

2—150 KW. Westinghouse 3 phase, 60 cycle rotary converters, 550 volts, 273 amps., 720 r.p.m., complete with 4—100 KW. Westinghouse Scott connected oil insulated transformers, 10,000/9500 volts prim., 430/362 volts secy.

150 Kilowatt 25 Cycle Rotary Converters

2—150 KW. General Electric type T. C., 4-150-750, 25 cycle, 3 phase, 575 volt, rotary converters, 750 r.p.m., complete with end play and speed limit device.

Railway Motors

2—75 to 90 HP. Westinghouse No. 112 Railway Motors, newly rewound, practically new.

IMMEDIATE DELIVERY

ARCHER & BALDWIN
114-118 Liberty Street New York City
TELEPHONE 4337-4338 RECTOR

MACGOVERN AND COMPANY
INC.

FRANK MACGOVERN, Pres. & Gen. Mgr.
114 LIBERTY STREET NEW YORK CITY
'Phone, 3375-3376 Rector

60 CYCLE ROTARY CONVERTERS

1 1000 KW. Gen. Elec., type HC, form P, 6 phase, 1667 amps., 600 volts D.C., 360 R.P.M.
2 300 KW. Gen. Elec., type HC, form P, 6 phase, 500 amps., 550 volts D.C., 900 R.P.M., with end play and speed limit device.
1 200 KW. Westinghouse, 3 phase, 600 volts D.C., 900 R.P.M., with starting motor.

550 VOLT DIRECT CURRENT UNIT

300 KW. Westinghouse, 550 volt, 145 R.P.M., dir. conn. to 16½" and 30½" x 30" Buckeye tandem engine.

Immediate Delivery

THIS IS OF NECESSITY ONLY A PARTIAL LIST—
SEND FOR CATALOG

MOTOR WANTED

One—375 to 500 H.P., 440 volt, 3 phase, 60 cycle, 3 bearing, with sub-base and rails. Speed not over 580 r.p.m. Slip ring type for use with external resistance. Must be guaranteed for continuous duty at full load. Give full details in first letter.

Cape Girardeau Portland Cement Co.
Cape Girardeau, Mo.

CARS FOR SALE

OPEN and CLOSED
MOTOR and TRAIL
Write for Price and Full Particulars to
ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

COMPLETE ARMATURES FOR SALE

FOR ALL THE STANDARD
STREET RAILWAY MOTORS
GET OUR PRICE WE CAN SAVE YOU MONEY
America's Greatest Repair Works
CLEVELAND ARMATURE WORKS, Cleveland, O.

Undisplayed
Cards Under
Positions Wanted
Cost 50 Cents
for 25 Words

Keep Your Eyes on the Journal's Searchlight Section

Machinery
Advertisements
Undisplayed
Cost $1.50
for 50 Words

SEARCHLIGHT SECTION

Get your Wants into the Searchlight

ADVERTISING RATES

Under "Positions Wanted," including Salesmen looking for new connections, Evening Work Wanted, Side Line Wanted, etc., undisplayed advertisements cost **two cents a word,** minimum charge 50 cents an insertion, **payable in advance.**

Under "Positions Vacant," including Agents and Agencies Wanted, Representatives Wanted, Salesmen Wanted, Partners Wanted, Desk Room Wanted or For Rent, Business Opportunities, Employment Agencies, and Miscellaneous For Sale, For Rent, and Want ads; also Auction Notices, Receivers' Sales, Machinery and Plants For Sale or Wanted (with one line of display heading), undisplayed advertisements cost **three cents a word,** minimum charge $1.50 an insertion.

If replies are in care of any of our offices, allow five words for the address.

All advertisements for bids (Proposals) cost $2.40 an inch.

ADVERTISEMENTS IN DISPLAY TYPE

cost as follows for single insertions:

$\frac{1}{16}$ p. ($1\frac{1}{8}$x$3\frac{3}{8}$ ins.)	$5.00	1 in. (1x$2\frac{3}{16}$ ins.)	$3.00
$\frac{1}{8}$ p. ($2\frac{3}{8}$x$3\frac{3}{8}$ ins.)	10.00	4 inches (4x$2\frac{3}{16}$ ins.)	11.60
$\frac{1}{4}$ p. (5x$3\frac{3}{8}$ or $2\frac{3}{8}$x7 ins.)	20.00	8 inches (8x$2\frac{3}{16}$ ins.)	22.40
$\frac{1}{2}$ p. ($10\frac{1}{4}$x$3\frac{3}{8}$ or 5x7 ins.)	40.00	15 inches	40.50

1 page ($10\frac{1}{4}$x7 ins.) 30 inches....$80.00

For space to be used within one year, to be divided to suit requirements of advertiser, provided some space is used in each issue following first insertion:

1 page	$80 a page	18 pages	$56 a page
3 pages	72 a page	26 pages	53 a page
6 pages	64 a page	40 pages	52 a page
12 pages	58 a page	52 pages	50 a page

In replying to advertisements, do NOT enclose original testimonials, drawings or photographs that you may want returned. Advertisements for men often produce several hundred applications and no employer can be expected to read all of these carefully and return the papers or applications of those in which he is not interested. State your experience and qualifications in as concise and neat a manner as possible and enclose COPIES of your testimonials.

When advertising machinery, use your own name and address—or a local address of some kind—so that the readers can wire direct and get quick replies. We advise also that you state in your advertisement the present location of plant that is offered for sale, or point of delivery provided you are in the market for equipment.

FOR SALE

A Metal Opportunity

Take advantage of the high prices of metal. We are cash buyers of all grades of scrap metal. Our specialty is buying electric plants, storage battery plants, storage battery plates and sediment. We buy small lots as well as large lots. Write us and tell us what you have and we will be pleased to quote you prices. National Metal & Rubber Co., 30-31 India Wharf, Boston, Mass.

Snow Plow for Sale

Single track, detachable iron snow plow; never been placed in service; photograph and full description on application. This plow capable of handling heavy drifts and is of first class construction throughout. The Trinidad Electric Transmission Railway & Gas Company, Trinidad, Colo.

550 Volt Generator for Sale

1—Fort Wayne, 150 kw, belted Railway Generator, in good condition, compound wound, 500-550 v., 6 p., 550 r.p.m., type M.P.L., form IB. Immediate shipment and very attractive price. F.o.b. Cambridge, Ohio. Write Ohio Service Co., Coshocton, Ohio.

D. C. Generators for Sale

1—100 Kw. 125-250 v. D.C. 3-wire Crocker-Wheeler generator set consisting of two 50 kw. generators, direct connected to a 150 hp Fleming-Harrisburg center-crank single cylinder engine good for 50% unbalancing. Both generators on same side of engine. Can be operated on greatly unbalanced 3-wire 125-250 v. system or on straight 2-wire 125 v. or 250 v. system.

1—200 kw. set same as above.

1—200 kw. 230 v. D.C. 500 r.p.m. Jenny belted generator with pulley, base and rheostat.

Standard Electric & Elevator Company,
123 S. Calvert St., Baltimore, Md.

RAILS

1500 tons 60 lb. Good
600 tons 56 lb. Good
500 tons 40 lb. New
600 tons 30 lb. Good
300 tons 25 lb. Good

OR ANY SECTION—NEW OR RELAY

Before buying
LOCOS., CARS, EQUIPMENT, MACHINERY, TANKS
See what Bargains can be obtained from
ZELNICKER IN ST. LOUIS
428 First Nat. Bk., Chicago
910 Hennen Bldg., New Orleans

MISCELLANEOUS WANTS

Motors Wanted

We are in the market for several A.C. and D.C. motors, and also some plating dynamos, any size or make. Write us what you have to offer. Schwartz & Land, 207 Centre St., New York City.

BUSINESS OPPORTUNITIES

Corporation Requires Financing

Public utility corporation requires financing. Opening for a man, firm or banking concern with knowledge of handling securities of power, light, traction and freight properties and engineering reports. Must control capital and be ready to assume active interest in the company. Full particulars to *principals only.* References required. Box 1233, Elec. Ry. Jour., 935 Real Estate Trust Bldg., Philadelphia, Pa.

POSITIONS WANTED

EXPERIENCED freight man wants position as general freight agent or manager of freight department. Excellent reasons for desiring change. Box 1248, Elec. Ry. Jour.

GENERAL manager electric railway and lighting properties open for position. Twenty years' experience handling properties for large banking concern. Box 1236, Elec. Ry. Jour., 935 Real Estate Trust Bldg., Philadelphia, Pa.

MASTER mechanic, 10 years' experience electrical and mechanical, with large interurban road. Open for position as master mechanic, electrical engineer or assistant. Box 1249, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

POSITION as superintendent or assistant to general manager. Have had 18 years' experience on electric and steam roads as inspector, dispatcher, assistant superintendent, etc. Am now employed on one of the largest interurban and city lines. Am able to install safest system of dispatching. Best of reference as to ability, character, etc., from present employer. Box 1243, Elec. Ry. Jour.

POSITIONS WANTED

POSITION wanted as street railway superintendent by man with 20 years' experience. Have had training in all departments. Box 1246, Elec. Ry. Jour.

PURCHASING agent, age 32, married, 10 years with one of the largest street railways in the United States; now filling this capacity in the automobile industry; desires to return to the traction field. Thoroughly familiar with modern purchasing methods. Salary $2,000. Box 1241, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

YOUNG man, six years in executive offices large Eastern street railway and lighting company. Now law clerk legal department. College graduate; member of bar. Can handle legal and claim work. Good assistant to busy executive. Box 1223, Elec. Ry. Jour., 935 Real Estate Trust Bldg., Philadelphia, Pa.

YOUNG man (23) now employed by electrical supply house as assistant buyer, desires position where a good knowledge of electrical and steel business, together with ability, will secure a good future. Box 1250, Elec. Ry. Jour.

POSITIONS VACANT

A LARGE street railway company in the Eastern States desires an operating superintendent to take charge of a division employing 200 blue uniform men. State full qualifications and terms. Replies will be considered in confidence. Box 1251, Elec. Ry. Jour.

A LARGE Eastern electric railway system desires the services of a high grade man to handle public relations and publicity work. State full qualifications and terms. Replies strictly confidential. Box 1252, Elec. Ry. Jour.

COACH painter wanted, one competent to take full charge and do all kinds of coach work. Permanent position to competent man. Box 1245, Elec. Ry. Jour.

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

More than 300 different products are here listed.

The Alphabetical Index (see eighth page following) gives the page number of each advertisement.

As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.

If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will promptly furnish the information.

Acetylene Apparatus. (See Cutting Apparatus, Oxy-Acetylene.)

Acetylene Service.
Prest-O-Lite Co., Inc.
Oxweld Acetylene Co.

Advertising, Street Car.
Collier, Inc., Barron G.

Air Cleaners.
Lord Mfg. Co.

Air Rectifiers.
Lord Mfg. Co.
National Safety Device Co.

Alloys and Bearing Metals. (See Bearings and Bearing Metals.)

Alloys, Steel and Iron.
Titanium Alloy Mfg. Co.

Anchors, Guy.
Electric Service Supplies Co.
Holden & White.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Automobiles and Buses.
Brill Co., The J. G.

Axle Straighteners.
Columbia M. W. & M. I. Co.

Axles, Car Wheel.
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Cincinnati Car Co.
St. Louis Car Co.
Standard Steel Works Co.
Westinghouse Elec. & M. Co.

Babbitting Devices.
Columbia M. W. & M. I. Co.

Badges and Buttons.
Electric Service Supplies Co.
International Register Co., The

Bankers and Brokers.
National City Co.

Batteries, Storage.
Electric Storage Battery Co.

Bearings and Bearing Metals.
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Hardy & Sons Co., Wm. A.
Long Co., E. G.
More-Jones Brass & M. Co.
St. Louis Car Co.
Westinghouse Elec. & M. Co.

Bearings, Center.
Baldwin Locomotive Works.

Bearings, Oilless, Graphite, Bronze and Wood.
Bound Brook Oilless Bearing Co.

Bearings, Roller and Ball.
Gurney Ball Bearing Co.
Hess-Bright Mfg. Co.
Railway Roller Bearing Co.

Bearings, Roller Side.
Holden & White.

Bells and Gongs.
Brill Co., The J. G.
Electric Service Supplies Co.
St. Louis Car Co.

Benders, Rail.
Niles-Bement-Pond Co.
Zelnicker Sup. Co., W. A.

Blow Torches for Soldering and Brazing. (See Cutting Apparatus, Oxy-Acetylene.)

Blowers.
General Electric Co.
Westinghouse Elec. & M. Co.

Boilers.
Babcock & Wilcox Co.

Boiler Cleaning Compounds.
Dearborn Chemical Co.

Bond Clips.
Electric Railway Improve. Co.

Bond Testers.
American Steel & Wire Co.

Bonding Apparatus.
Electric Railway Improve. Co.
Ohio Brass Co.
Oxweld Acetylene Co.
Prest-O-Lite Co., Inc.

Bonding Tools.
American Steel & Wire Co.
Electric Railway Improve. Co.
Electric Service Supplies Co.
Ohio Brass Co.

Bonds, Rail.
American Steel & Wire Co.
Electric Railway Improve. Co.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Bonds Welded.
Lincoln Bonding Co.

Book Publishers.
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel.
Niles-Bement-Pond Co.

Braces, Rail.
Kilby Frog & Switch Co.

Brackets and Cross Arms. (See also Poles, Ties, Posts, Etc.)
Bates Expanded Steel Truss Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Int'l Creosoting & Constr. Co.
Lindsley Bros. Co.
Ohio Brass Co.

Brake Adjusters.
Smith-Ward Brake Co.

Brake Shoes.
Amer. Brake Shoe & Fdy. Co.
Barbour-Stockwell Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Long Co., E. G.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts.
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Holden & White
Long Co., E. G.
Lord Mfg. Co.
National Brake Co.
National Safety Device Co.
St. Louis Car Co.
Westinghouse Trac. B. Co.

Brooms, Track, Steel or Rattan.
Zelnicker Sup. Co., W. A.

Brush Holders.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Brushes, Carbon.
Dixon Crucible Co., Jos.
General Electric Co.
Jeandron, W. J.
Morgan Crucible Co.
Westinghouse Elec. & Mfg. Co.

Buckets, Grab.
Beaumont Co., R. H.

Bumpers, Car Seat.
Electric Service Supplies Co.

Bunkers, Coal.
Beaumont Co., R. H.

Bushings, Case Hardened and Manganese.
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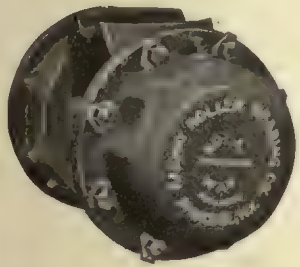

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Over in India the native marks off a square in which he eats his meals. This juggar represents isolated purity. If an alien passes and his shadow falls within the juggar the food is contaminated and the poor man would lose caste if he ate it.

Naturally you feel that a shadow isn't much to get upset about. But you shouldn't feel that way. The man who can forecast a coming event by its shadow is tomorrow's leader.

For instance, take that black shadow on a commutator. It is the shadow of misapplied carbon brushes and the forewarning of trouble.

The man of *action* when he sees it will promptly call in a Morgan expert to prescribe a type of Morganite brush that will bring the commutator back to a healthy gloss.

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NOTICE TO ADVERTISERS:

Printing begins on Tuesday of each week.

Changes of copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for OK before publication.

New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.

If proofs before printing are required, change of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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HESS-BRIGHT

NOT CONTROLLED BY OUTSIDERS

TO correct misleading rumors and statements The Hess-Bright Manufacturing Company, makes the following announcement:

A group of bankers, including Frank A. Vanderlip, Philip W. Henry, Thatcher M. Brown and Franklin B. Kirkbride, of New York, and Marcus Wallenberg, of Stockholm, Sweden, has recently acquired from the American group of stockholders a controlling interest in the shares of The Hess-Bright Manufacturing Company. This group of bankers owns also a substantial interest in the S. K. F. Ball Bearing Company of Hartford, Connecticut.

The two companies will be operated quite independently of each other. The former policy of The Hess-Bright Manufacturing Company will be continued except that its manufacturing facilities will be increased somewhat more rapidly to meet the constantly growing demand for its product. B. D. Gray, who retains his former stock holdings, will continue to manage the business as President. F. E. Bright retires from active participation in the Company's affairs, but remains identified with the Company as Chairman of the Board. Aside from these two changes, the organization remains as before.

The Directors are:

F. E. BRIGHT,
Chairman.

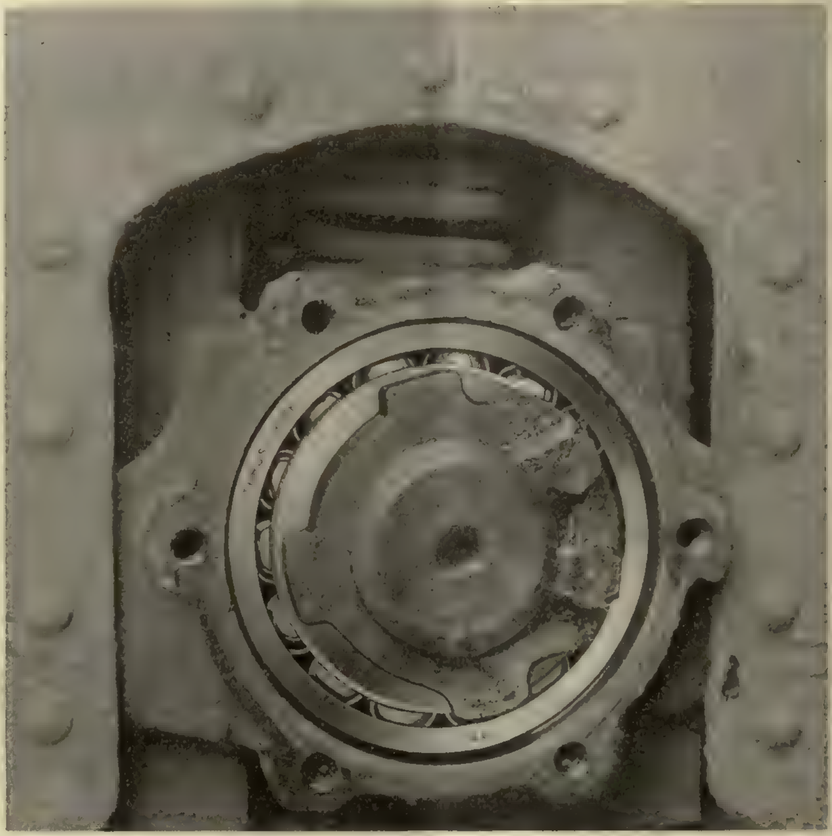
B. D. GRAY,
President of The Hess-Bright Manufacturing Company.

WILLARD PARKER BUTLER,
of New York City.

ARTHUR V. MORTON,
Vice President of the Pennsylvania Company for Insurance on Lives and Granting Annuities, of Philadelphia.

PAUL von GONTARD,
Managing Director of the Deutsche Waffen-und Munitions Fabriken, Berlin, Germany.

Philadelphia, Pa., November 14, 1916



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ELECTRIC RAILWAY JOURNAL

New York, November 25, 1916 McGraw Publishing Co. Inc. Vol. 48, No. 22 10c a copy

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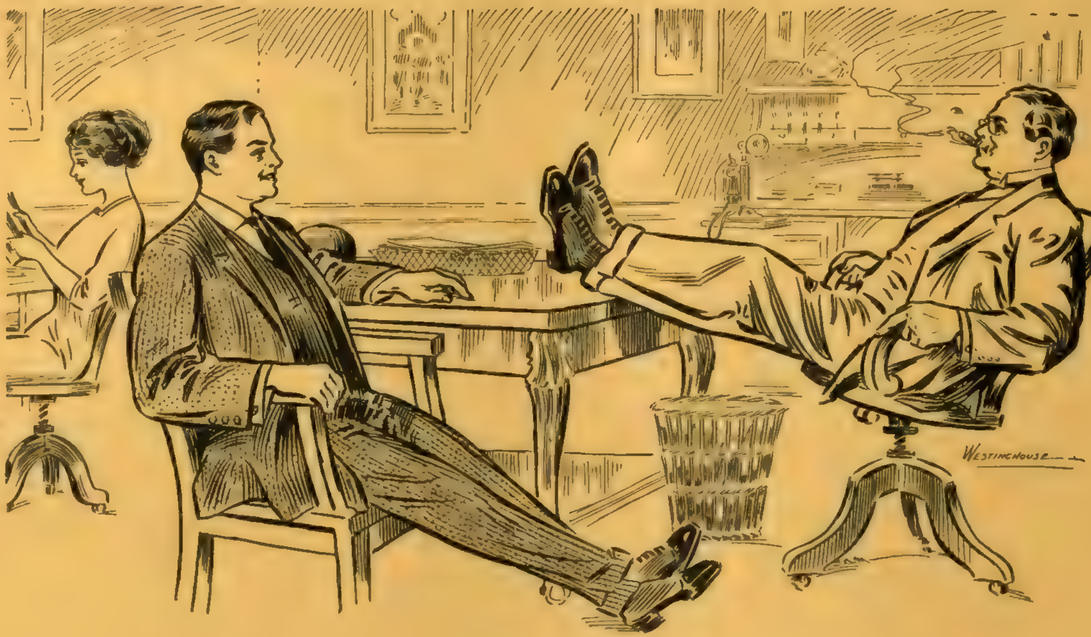

Many Thanks

"WELL, Joe," said the General Manager to the Superintendent, "what have you to be thankful for this year?"

"A whole lot, Boss," answered Joe. "On the business side, I'm thankful that our rolling stock is in such fine shape and is giving such good account of itself. I'm thankful that, even with increased traffic and more cars in service, our maintenance cost has not perceptibly risen, and above all, I am thankful that all our cars are now equipped with Westinghouse Motors and HL Control, without which I wouldn't have all this to be thankful for."

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ELECTRIC RAILWAY JOURNAL

VOLUME XLVIII, No. 22 NEW YORK, NOVEMBER 25, 1916 PAGES 1089 TO 1138

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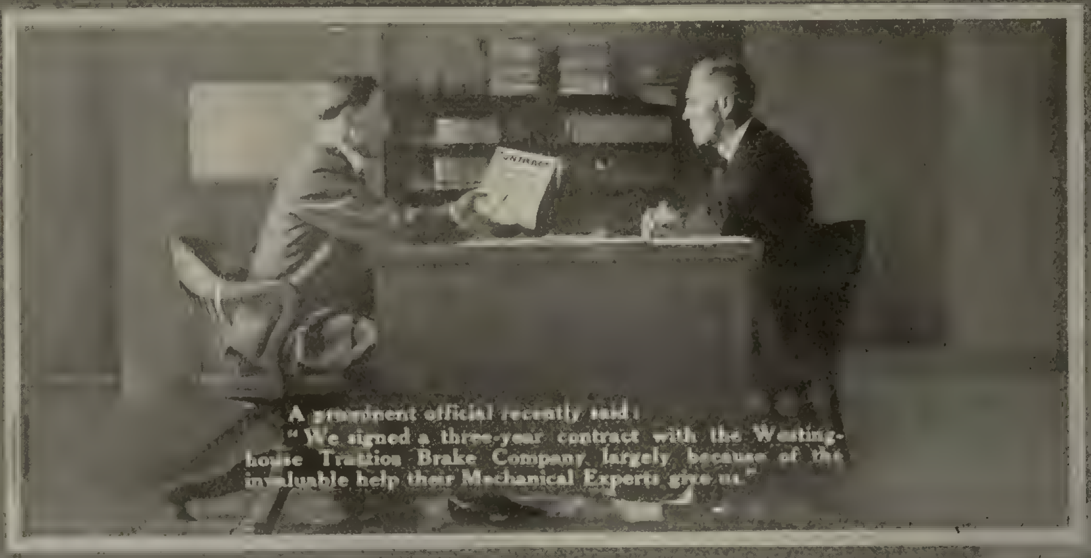
Circulation of this issue 7250 copies

The Members of our Field Force are practical men who give their undivided attention to the Brake work of our customers—and their services are free.



A prominent official recently said:
"We signed a three-year contract with the Westinghouse Traction Brake Company largely because of the invaluable help their Mechanical Experts give us."

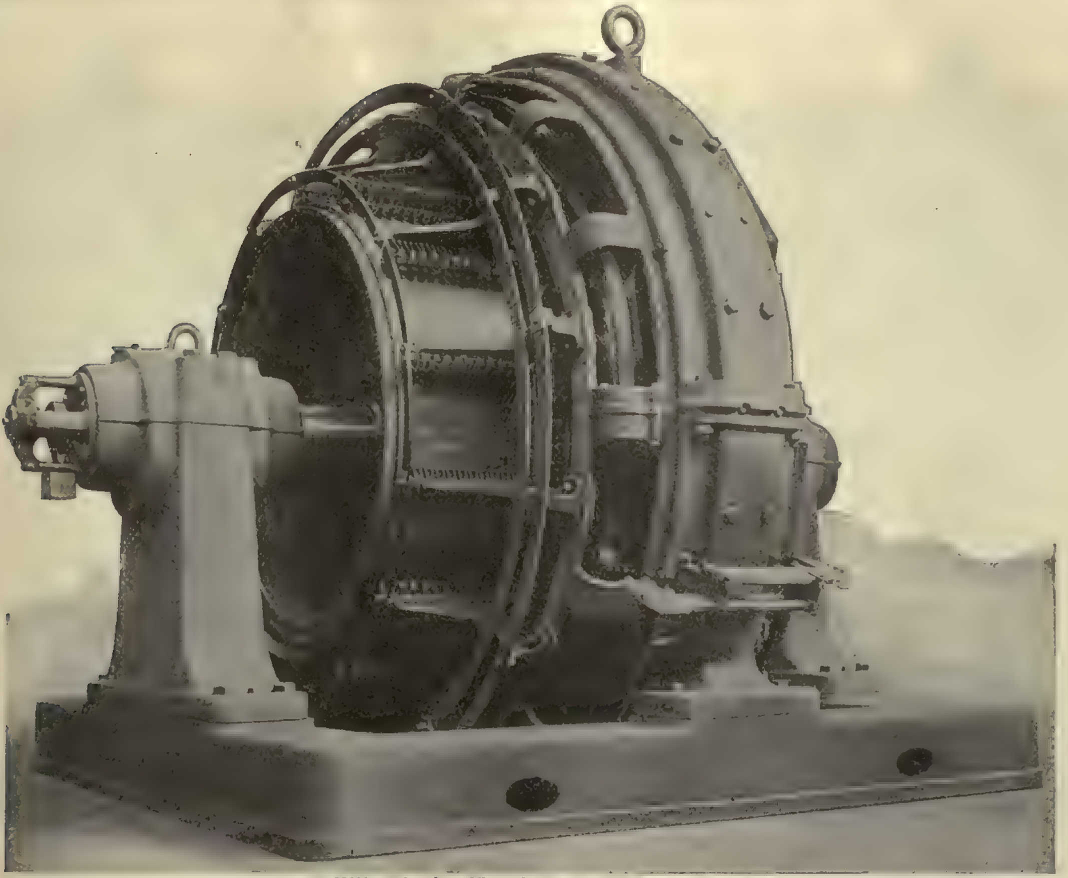
Westinghouse Traction Brake Company

General Offices: Wilmerding, Pa.

PITTSBURGH:
Westinghouse Building
CHICAGO:
Railway Exchange Building

TRADE MARK

NEW YORK:
City Investing Building
ST. LOUIS:
Boatmen's Bank Building



4,000 KW, 625 volts, 25 cycle, 214 RPM Rotary Converter

W
WESTINGHOUSE
ELECTRIC

World's Record

The Interborough Rapid Transit Co.
have just placed a single order for

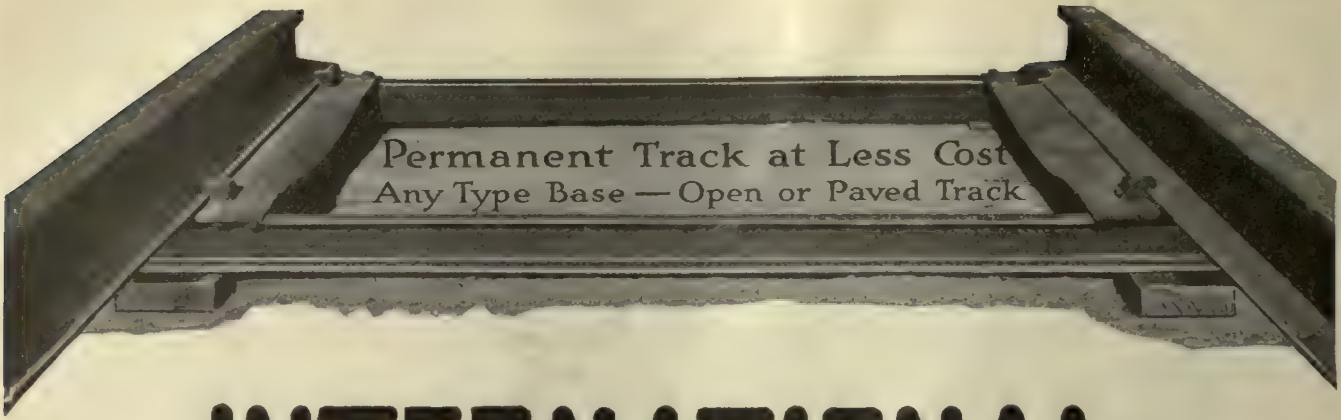
Twelve 4,000 Kilowatt
Westinghouse
Rotary Converters

with Transformers

48,000 Kilowatts, Normal Capacity
144,000 Kilowatts, Swing Capacity

Westinghouse Electric & Mfg. Company
East Pittsburgh, Pa.

Westinghouse


Permanent Track at Less Cost
Any Type Base — Open or Paved Track

INTERNATIONAL
STEEL TWIN TIES

30%-80% Saving in Cost of Fastenings

When you buy an International Steel Twin Tie you buy a complete 6-ft. track unit (with exception of rails) all ready to lay. It requires no tie rods, plates or spikes with the necessary installation labor. Four rugged steel clips drop into each end plate, and when wedged into position hold the rail to the tie against shock, vibration and wear.

Here is a saving that easily amounts to 33⅓% of the cost of track materials exclusive of rails. And the better method of rail fastening makes the track more secure—66% fewer fastenings to come loose and cause trouble—increased holding power.

In dollars and cents this is the smallest saving made possible by the use of International Steel Twin Ties—labor, foundation materials and maintenance are the big ones.

Our next advertisements tell about them.

Let us submit comparative estimates for your job.

The International Steel Tie Company

General Sales Office and Works: Cleveland, Ohio

REPRESENTATIVES:

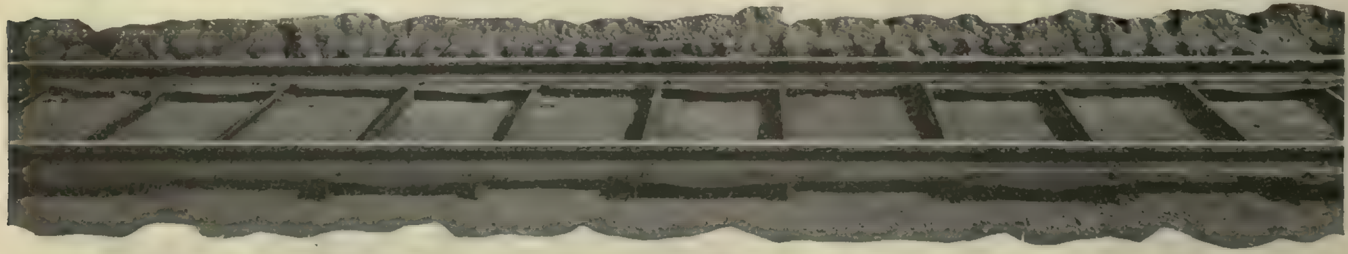
Western Eng'g Sales Co., San Francisco, Cal. Los Angeles, Cal. Seattle, Wash.

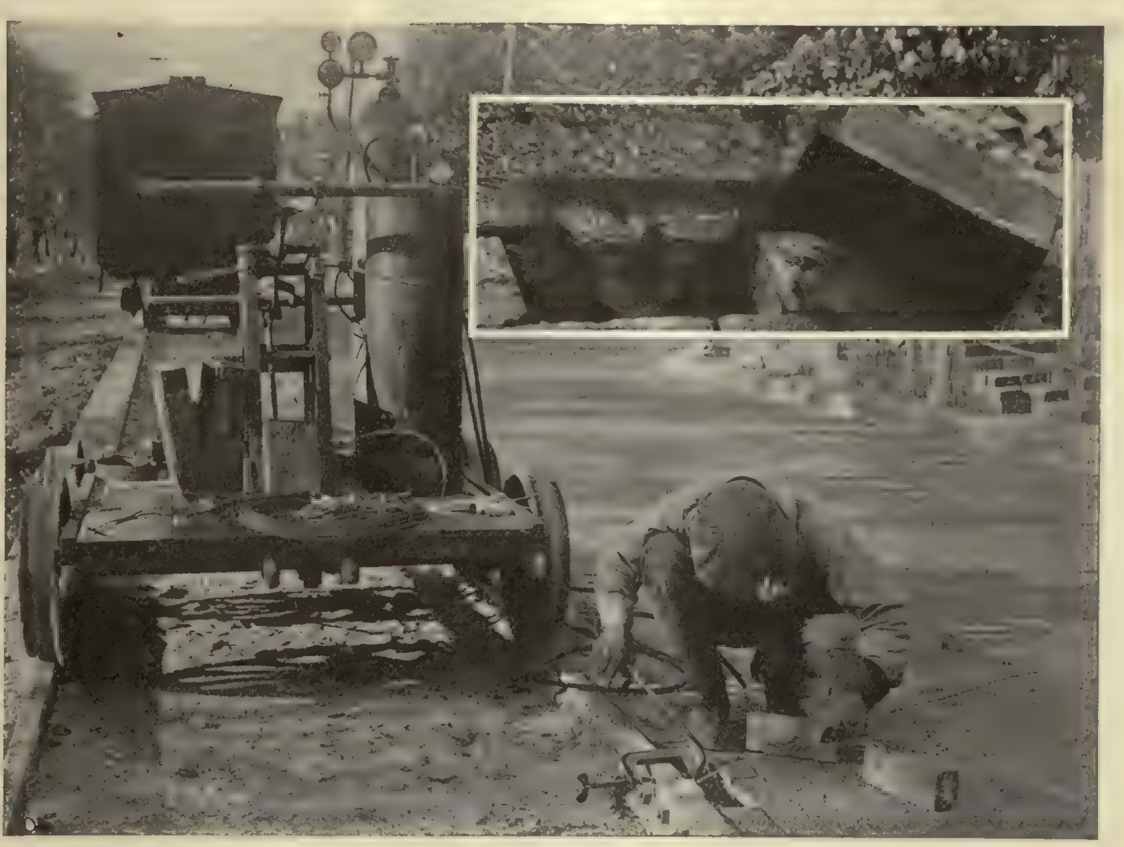
R. J. Cooper Co., Salt Lake City, Utah.

J. E. Lewis & Co., Dallas, Texas.

Maurice Joy, Philadelphia.

William H. Ziegler, Minneapolis, Minn.





Bonding in Paved Streets Easy

Just take out one or two bricks and there's plenty of room to install the O-B Gas-Weld Bond. A clamp may be used to hold the bond during the welding or a little sand banked against it will do as well.

Skilled labor is unnecessary. An ordinary workman, after a little instruction, can put on these bonds.

And once on, they are on to stay. The large intimate contact—or rather union—with the rail is enduring, both mechanically and electrically.

The finished terminal is tapered so that wagon-wheels and the like glance without doing damage.

O-B Gas-Weld Bonds are giving good service on many properties. Shall we tell you more about them?

The Ohio Brass Co.
Mansfield, Ohio

Annual Statistical Number Electric Railway Journal

January Sixth, Nineteen Seventeen

Is a Mighty Good Issue for Real Advertising

The **Statistical Number** of the ELECTRIC RAILWAY JOURNAL is the annual review and forecast of the electric railway industry.

Its figures on equipment bought during the preceding year, of purchases contemplated during the coming year, of technical and financial developments, are of the greatest interest, alike to investor, engineer, operator and manufacturer.

Your Wisdom in Advertising

on a liberal basis in the Statistical Number cannot be questioned, for thereby you convert to **your** benefit the prestige of an issue which carries original, exclusive and much-desired information.

The same high standard of service which the Electric Railway Journal gives to its **subscribers** is available to its **advertisers.**

Take advantage of that service in all issues of the ELECTRIC RAILWAY JOURNAL beginning with the

Annual Statistical Number

January Sixth, Nineteen Seventeen

Consider the Autumn Leaf

—and all that it implies—"greasy," rain-wet rails, that make emergency stops difficult—blizzard and sleet-storm to come later, too—

Everything in the way of weather that can make operation difficult—and *dangerous:*

And put your signal system to the acid test.

Take thought to the *future*—and install United States Electric Signals *now:*

Eliminate the *cause* of emergency stops to avoid collisions —prevent crews from "taking a chance" to gain time—wipe out delays and disputes caused by hand-signalling—

Make *your* signal system *independent* of weather conditions—keep *your* cars running *safely*—on attractive schedules—by installing United States Car Spacers.

That's the way for an *electric* railway man to solve an *electric* railway problem.

The cost? Small in comparison with the benefits—ask for our proposition.

United States Electric Signal Company

West Newton, Massachusetts

Representatives:
Western: Frank F. Bodler, Monadnock Bldg., San Francisco
Chicago: Warren Moore Osborn, McCormick Bldg.
Foreign: Forest City Electric Service Supply Company, Salford, Eng.

Phono-Electric

—the Trolley Wire of Long Life

Fifty-fourth St. and Lansdown Ave., Philadelphia

Is Self-evident for Curves

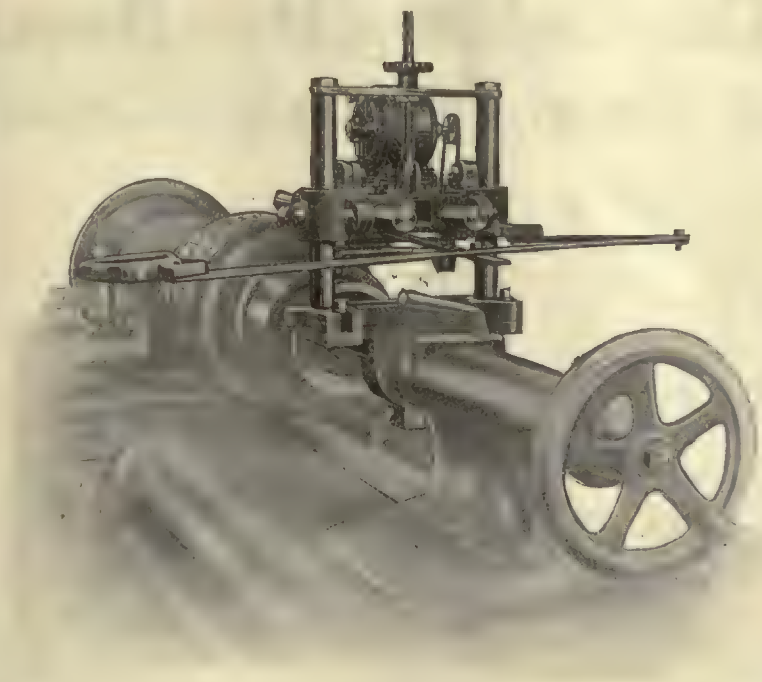
THE practical impossibility of accurately maintaining curve trolley wire in the correct position relative to the wheel is acknowledged by every line engineer.

It is at curves and turnouts, therefore, that ordinary trolley wire is likely to wear out in a few months, and call for replacement under difficult conditions of installation.

Many systems which began with Phono-Electric for use on curves only, now use it extensively on straight track also. Under the most severe conditions Phono-Electric Wire will give three times the service of ordinary copper trolley wire.

BRIDGEPORT BRASS CO.
BRIDGEPORT CONNECTICUT

Use This Slotter on Your Lathes



Commutator Slotting Machine Installed—Lathe Type

Speed-up Your Armature Repairs

You can speed-up your armature repairs by installing Peerless Slotting and Tension Machines on your lathes, or better still, by using our Universal Armature Machine, which combines a number of these special tools in one machine. Peerless tools are perfectly designed, compact in construction and offer the most practical means for doing this work.

Write for your copy of our new catalog showing complete line of Peerless Armature Tools. Do this now.

And Use This Band Wire Tension Machine

Armature Band Wire Tension Machine Installed

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Sts.

NEW YORK
50 Church St.

CHICAGO
Monadnock Bldg.

Interurban Car Lighting Has Never Equalled the Steam Railway Coach

Where interurbans parallel steam railways, with schedules equal and fares lower, night passenger traffic moves to steam roads largely because of better car lighting. Traveling men particularly do this to read or check up the day's work. Reading cannot be done in comfort where lights are so affected by fluctuating voltage. There are roads endeavoring to make a success of parlor car service where it is impossible for passengers to read.

The Watson Car

The first road to equip with the Watson car lighting regulator is the Milwaukee Northern. Two years ago the General Manager of this line installed one regulator on the "Drummers' Special" from Sheboygan to Milwaukee, in order to compete with the evening steam train.

When this car was withdrawn for periodical inspection the complaints of poor lighting on that run came so quickly and definitely that another car was immediately equipped.

Since then Watson regulators have been secured for all twelve passenger cars, and the Milwaukee Northern has car lighting practically independent of line fluctuations and incandescent headlights showing 1400 to 1500 feet of track constantly. They have not spent a cent for repairs and have materially reduced their cost for incandescent lamps.

The Watson regulator controls both interior lights and headlights (either arc or incandescent), provides the simplest car wiring ever proposed, reduces current consumption, offers either direct or indirect steady car illumination and can be installed on almost any car.

It is a fool-proof, reliable device produced in the Cutler-Hammer factory. It consists of a number of electro-magnetic relays which operate as the line voltage varies, and in two years' constant use not a single adjustment has ever been necessary. Consequently this is not an experimental proposition.

The regulator provides for a constant current of four amperes through the headlight, marker and car lights. This is better than a constant voltage regulation, which has been the unattainable aim of all other designers. Thos. F. Watson, however, had had a successful voltage regulator also operating for two years, but experience shows that the constant current regulator is preferable.

1508 Fisher Building

Holden

General Sales Distributors for The

Increase Your Night Travel By Furnishing Steady Illumination

It is a source of vexation to electric railway managers that they can provide sufficient power for car operation without too great loss, but cannot give satisfactory illumination. You cannot increase passenger business unless you furnish comfortable conditions. And good lighting is essential. Many schemes have been tried to improve the interior lighting and headlights but so far only one device has proven entirely satisfactory, in two years' service tests.

Lighting Regulator

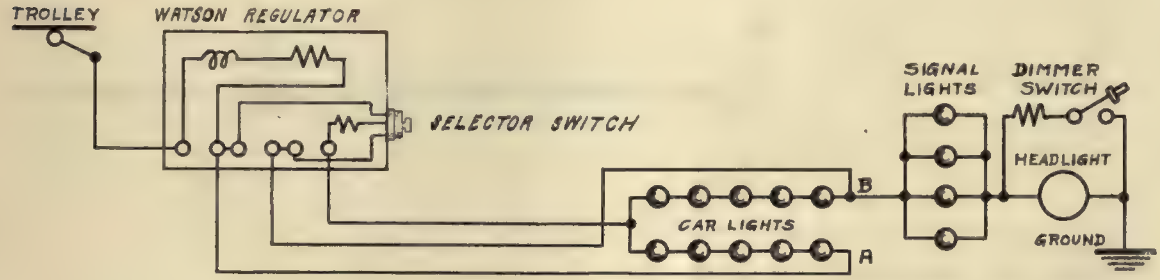
The Watson regulator is designed to maintain the car lights at normal intensity, within a range of six per cent, over a voltage drop of 280 volts. For example, on a maximum trolley voltage of 600 the regulator maintains proper car illumination down as low as 320 volts.

In effect the regulator puts the car lights in place of your old arc headlight resistance, thereby decreasing the current consumed. At present you use 2.4 KW for headlight (4 amp. x 600 volts) and 1 KW car lighting (5 series, 36 watt bulbs). The regulator, headlight and car lights require a total of 2.4 KW.

In the car you use standard listed street series four ampere gas-filled Mazda lamps, secured from any lamp works on your regular contract. These are all low voltage standard candle power lamps with heavy filaments, like automobile headlight bulbs, and are not affected by vibration as are high voltage lamps.

You can use 32, 40, 60 or 100 candle power lamps, for example, depending upon the installation possible, and either the standard 4-ampere arc or 4-ampere 80-volt incandescent headlight lamp.

All of the lamps are in series, and in case one burns out, extinguishing all, a simple 3-way selector switch puts a shunt around half the lamps, and the other half burn as usual until the defective bulb is replaced. In writing state your line voltage, lamp wattage and number of circuits.



& White

Chicago, Illinois

Car Lighting Improvement Company

CHAMPION

Rail Bonds

1—

Full 8 to 1 contact area to cross-section of bond. Full contact area brazed to rail.

2—

No corrosion of terminals and hence no increase in resistance.

3—

They stay put. Takes a cold chisel and hammer to get them off.

4—

Bonds properly designed to resist vibration.

Write for details

The Electric Railway Improvement Co.
Cleveland, Ohio

CHAMPION

Bonding Apparatus

1—

Work can be done while cars are passing, hence no interruption to traffic.

2—

Heat produced by incandescent carbon, hence no injurious arc or flame used.

3—

Choice of mountings to meet local conditions.

4—

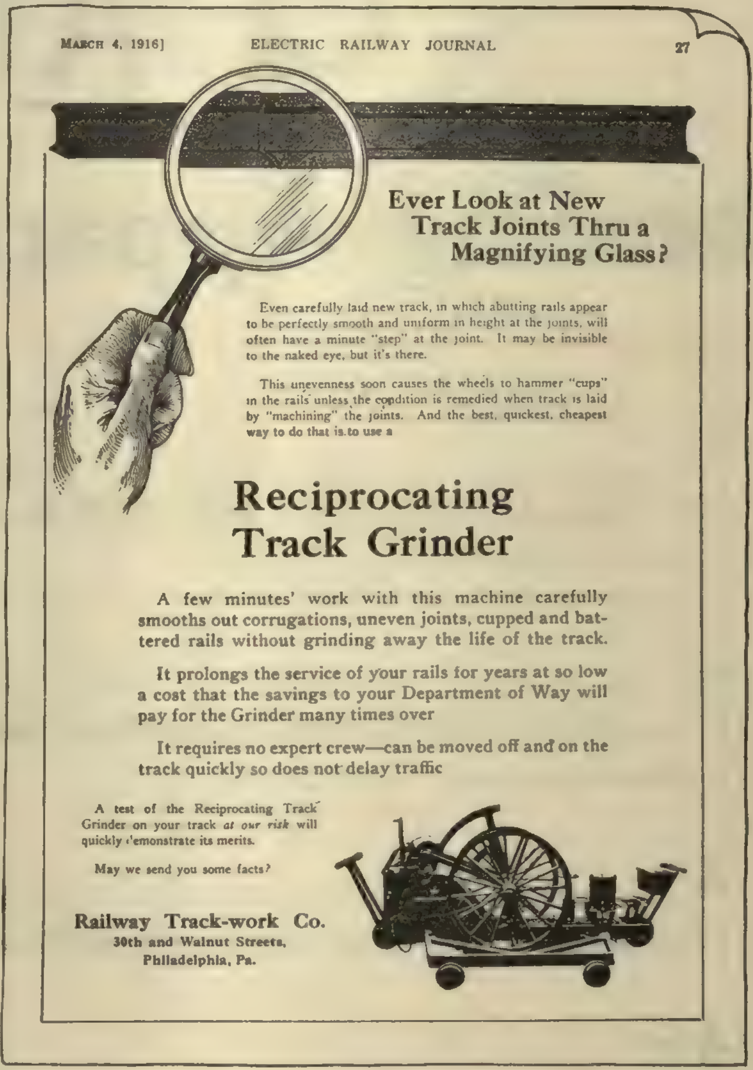
Saves time and money from every standpoint.

Write for details

The Electric Railway Improvement Co.

Cleveland, Ohio

The U. S. Government Bears Us Out



MARCH 4, 1916] ELECTRIC RAILWAY JOURNAL 27

Ever Look at New Track Joints Thru a Magnifying Glass?

Even carefully laid new track, in which abutting rails appear to be perfectly smooth and uniform in height at the joints, will often have a minute "step" at the joint. It may be invisible to the naked eye, but it's there.

This unevenness soon causes the wheels to hammer "cups" in the rails unless the condition is remedied when track is laid by "machining" the joints. And the best, quickest, cheapest way to do that is to use a

Reciprocating Track Grinder

A few minutes' work with this machine carefully smooths out corrugations, uneven joints, cupped and battered rails without grinding away the life of the track.

It prolongs the service of your rails for years at so low a cost that the savings to your Department of Way will pay for the Grinder many times over

It requires no expert crew—can be moved off and on the track quickly so does not delay traffic

A test of the Reciprocating Track Grinder on your track *at our risk* will quickly demonstrate its merits.

May we send you some facts?

Railway Track-work Co.
30th and Walnut Streets,
Philadelphia, Pa.

In the March 4, 1916, issue of the Electric Railway Journal we ran the advertisement reproduced herewith.

On March 10, 1916, the U. S. Bureau of Standards issued Technologic Paper No. 62 on Modern Practice in the Construction and Maintenance of Rail Joints and Bonds in Electric Railways. We quote the following from that paper:

"Nonuniformity of Rail Sections—No two rail sections will be found to be absolutely identical. The difference will vary from an inappreciable minimum to the maximum allowed in the specifications adopted by the American Society for Testing Materials. These inequalities are the result of wear of rolls and different degrees of shrinkage with cooling."

"Continual pounding of a joint eventually develops a cup in the receiving rail and **rapid deterioration follows if the joint is not given proper attention.**"

"Failure to Grind Joints—Slight inequalities exist in rail heads as well as in the finishing surfaces, so that on newly bolted joints a difference in elevation of the abutting rails often exists and **unless filed or ground down to a perfect surface alignment will soon develop pounding and cupping.** A number of companies now make a practice of running over all newly bolted joints with a track grinder and find that **the slightest expense is well justified** by the increased smoothness and resulting longer life of the joints."

The U. S. Government bears us out in everything we said in our advertisement except in the claims we made for our

Reciprocating Track Grinder

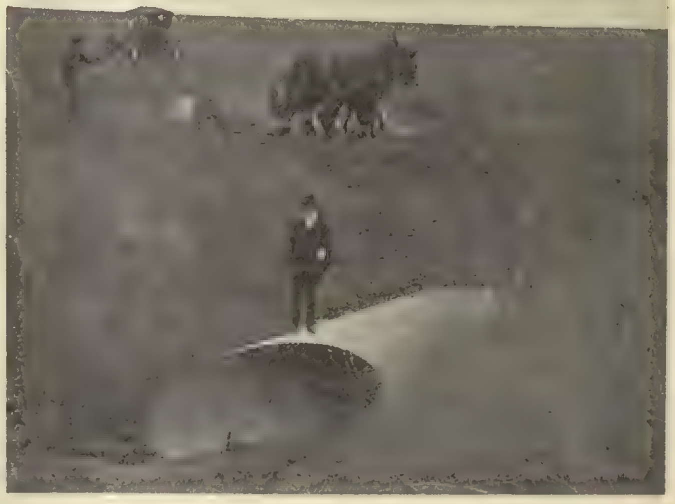
You can prove that part by trying out our grinder on your tracks. You don't have to pay for the grinder till it proves itself by its service.

Railway Track-work Company

30th and Walnut Streets
Philadelphia, Pa.

Rapid, Effective, and Lasting Work

in the installation of drainage structures for steam and electric railroads is accomplished by the use of



"ARMCO" IRON CULVERTS

The upper illustration is of a 60-inch corrugated pipe, 82 ft. long, made from 10-gage "Armco" Iron, being installed under the tracks of a great interurban railroad. Note the bevelled end to conform with the line of the end-wall.

The lower picture shows twin 18-inch culverts of the same material.

"Armco" (American Ingot) Iron, the product of the American Rolling Mill Co., is the standard for purity and rust-resistance. Its adoption has made of the corrugated culvert a reliable and *lasting* installation.

AMERICAN ARMCO INGOT IRON

Resists Rust

Write or phone the nearest manufacturer for full information as to "Armco" Iron Culverts, Siphons, Flumes, Sheets, Roofing and Formed Products.

Arkansas, Little Rock
Dixie Culvert & Metal Co.
California, Los Angeles
California Corrugated Culvert Co.
California, West Berkeley
California Corrugated Culvert Co.
Colorado, Denver
R. Hardesty Mfg. Co.
Delaware, Clayton
Delaware Metal Culvert Co.
Florida, Jacksonville
Dixie Culvert & Metal Co.
Georgia, Atlanta
Dixie Culvert & Metal Co.
Illinois, Springfield
Illinois Corrugated Metal Co.
Indiana, Crawfordsville
W. Q. O'Neall Co.
Iowa, Des Moines
Iowa Pure Iron Culvert Co.
Iowa, Independence
Independence Culvert Co.
Kansas, Topeka
The Road Supply & Metal Co.
Kentucky, Louisville
Kentucky Culvert Co.
Louisiana, New Orleans
Dixie Culvert & Metal Co.
Maryland, Baltimore
Wm. M. Baker, Munsey Bldg.
Massachusetts, Palmer
New England Metal Culvert Co.
Michigan, Bark River
Bark River Bridge & Culvert Co.
Michigan, Lansing
Michigan Bridge & Pipe Co.
Minnesota, Minneapolis
Lyle Corrugated Culvert Co.
Minnesota, Lyle
Lyle Corrugated Culvert Co.
Missouri, Moberly
Corrugated Culvert Co.
Montana, Missoula
Montana Culvert Co.
Nebraska, Lincoln
Lee-Arnett Co.
Nebraska, Wahoo
Nebraska Culvert & Mfg. Co.
Nevada, Reno
Nevada Metal Mfg. Co.
New Hampshire, Nashua
North-East Metal Culvert Co.
New Jersey, Flemington
Pennsylvania Metal Culvert Co.
New York, Auburn
Pennsylvania Metal Culvert Co.
North Dakota, Wahpeton
Northwestern Sheet & Iron Works
Ohio, Middletown
The Ohio Corrugated Culvert Co.
American Rolling Mill Co.
Oklahoma, Shawnee
Dixie Culvert & Metal Co.
Oregon, Portland
Coast Culvert & Flume Co.
Pennsylvania, Warren
Pennsylvania Metal Culvert Co.
South Dakota, Sioux Falls
Sioux Falls Metal Culvert Co.
Tennessee, Nashville
Tennessee Metal Culvert Co.
Texas, Dallas
Wyatt Metal Works
Texas, El Paso
Western Metal Mfg. Co.
Texas, Houston
Lone Star Culvert Co.
Utah, Woods Cross
Utah Corrugated Culvert & Flume Co.
Virginia, Roanoke
Virginia Metal Culvert Co.
Washington, Spokane
Spokane Cor. Culvert & Tank Co.
Wisconsin, Eau Claire
Bark River Bridge & Culvert Co.

"The technical or trade journal of today is the livest, most 'up-to-now' assistant that the public utility man has"

—says H. S. COOPER, secretary Southwestern Electrical & Gas Association, on the reading of technical journals.

He further says:

"It is the Always Ready Reference of the minute, and the officer, official, head of department, or even workman, who does not use it is neglecting one of his best friends!

"Now, I am not soliciting subscriptions for any trade or technical publication; I am not interested financially in any of them; my only interest in their use is that I have not only found them of immense value in all the businesses which I have managed, but I have yet to find a real up-to-date, hustling, successful manager or head of department who does not promptly and fully read his technical and trade publications, note and file the matter that interested him or was or would be of use to him in his business. * * * And in no other way can any operative, no matter how high or low his position, keep so fully abreast of the times in his business as by early and careful perusal of his trade and technical periodical from its front to its back cover. And from no other source can he obtain the immediately useful as he can from a well-filled and indexed present volume of those same publications.

Those who have tried this know that the above is the truth. Let those who have not tried it **give it a trial for six months or a year** and they will thank me for calling their attention to this matter!"

Here's the COUPON that will bring it—the Electric Railway Journal— to *you* on trial!

ELECTRIC RAILWAY JOURNAL
239 West 39th Street, New York

....

You may enter my subscription for the Electric Railway Journal for one year.

Cross out one of these lines }
I enclose $........ herewith.
I agree to send $........ not later than...............
(Please give definite date)

Name..
Address Copies to..
Street Address..
City..............................State..................
Company........................Position..................
Business of Company..

Yearly Subscription Rates: Domestic $3.00, Canadian $4.50, Foreign $6.00

The most useful

Electric Railway Handbook

in combination with

Electric Railway Journal

at a saving of $2

(TO OLD AND NEW SUBSCRIBERS)

A $500 Idea

A man prominent in the Electric Railway field made the statement the other day that a single idea found in his copy of the Electric Railway Journal was worth $500 to him.

How many $500 ideas are you missing?

There are $500 ideas in every issue of the Journal. Perhaps the very issue you don't read, or can't get at, has a $500 idea for you. You ought to join the great army of Journal readers who—

receive their copies of the Journal each week; who—
have it when they want it, and as long as they want it; who—
keeps their own file for reference.

Avoid Ruts—

THE motorist on the modern highway constantly meets the sign, "Keep to the Right. Avoid Ruts." In the electric railway world a similar warning is needed to guard us against traveling in one small path. Nothing imposes greater obstacles to progress than shutting ourselves up in our own little spheres and depending too much upon ourselves.

The most successful man—

THE most successful man is the man who has learned best how to adapt and use for his own purposes the experiences of others. The Electric Railway Journal has enabled thousands to do this. The Journal brings to you in definite, easily understood, practical, useable form, the experiences of successful men in every branch of electric railroading. Here's what one subscriber, whose name we will furnish on request, says regarding its value:

"A Journal reader adds to his fund the knowledge, experience and the results of the costly experiments of all electric railways in existence, and a complete Journal file will give him the sum total of all electric railway knowledge extant."

How the JOURNAL *helps its readers—*

EVERY issue of the Journal provides a fund of definite proven ideas. Hundreds of readers find it a valuable assistant in the solution of their most difficult problems. Let M. S. Mentzel, of Tarentum, Pennsylvania, tell you in his own words his experience as a Journal reader:

"It (the Journal) has helped me in many ways, more particularly in the mechanical end. I have taken many profitable ideas and used them in our shop to advantage. The Journal spurs a man to greater effort by showing him the results of others, thus acting as a booster to his ambition."

For more than 30 years the leading electric railway publication—

MR. MENTZEL'S experience is that of thousands of other satisfied Journal readers. For more than thirty years the Electric Railway Journal has kept its readers informed on developments in electric railroading. Each week its columns are full of the best ideas of the ablest minds and the latest news of the industry. Men in every important department—executive, operating, maintenance, construction and engineering – regard the Journal as an encyclopedia of information on the electric railway industry. They depend upon it unreservedly for information regarding developments and tendencies in electric railroading.

A new service—

THIS service is essential and valuable. But many Journal readers require reference data which cannot be furnished by, and do not belong in, a technical journal. Practical men who run power plants, superintend traffic and transportation, or manage properties require a handbook to guide them over the rough spots. They need an easy sure method of getting dependable information on all the various departments of electric railroading.

The answer is Richey's Electric Railway Handbook in combination with the Electric Railway Journal. Richey's Electric Railway Handbook is an encyclopedia of information on the broad subject of electric railroading. It covers every phase of the work from the design and construction of an electric railway system to its operation and maintenance—all so clearly and simply indexed that information on a given topic may be found in a moment's time. Details of its contents which follow on the next page will at once reveal the remarkable breadth and utility of the book.

Richey's Electric Railway Handbook

is for the Operating, Constructing or Designing Engineer—or Student

ITS aim is to present data on the subjects which come up in every-day electric railway practice. It may be used by the non-technical manager or operator as well as by the engineer. It is equally valuable as a convenient reference book on electric railway practice for those who may be specializing in other or allied lines.

We claim for the Electric Railway Handbook absolute preeminence in electric railway literature. We are not satisfied with merely saying that it is superior to ***any*** work of its kind — but we claim it to be the ***only*** work of its kind and we want your most critical opinion after you see it.

A typical letter of attestation follows:

"***Without exception*** I find Richey's work to be the most complete and least padded handbook with which I am familiar It is especially valuable to superintendents, master mechanics, electrical, mechanical and civil engineers." —BRYON T. MOTTINGER, Electrical Engineer, Fort Dodge, Des Moines & Southern Railroad Co., Boone, Iowa.

Is there anything about the subject of Electric Railway Work you want to know which is not taken up in Richey's book? This list of contents will tell you:

I. Roadbed and Track

Engineering Costs.
Right of Way.
Grading.
Handling Earthworks.
Power Shovels.
Transportation of Earth.
Ballast and Ties.
Fences.
Street Railway Roadbed.
Rails; Sections and Composition.
Rail Joints.
Rail Corrugation and Wear.
Track Laying Bolts, Spikes.
Track Grades and Curves.
Track Special Work.
Electric Track Switches.
Subway and Tunnel Sections.

II. Buildings

Car House Track Layout.
Design of Car House Building.
Fire Protection and Prevention.
Details of Car House Design.
Repair Shop Design.

III. Train Movement

Schedules, Headways, Stops.
Coefficient of Adhesion.
Grades, Actual, Ruling, Virtual.
Train Resistance.
Track Curve Resistance.
Track Grade Resistance.
Acceleration.
Run Curves.
Traction Power Requirements.
Energy Consumption.
Electric Car Tests.

IV. Railway Motors

Preliminary Selection of Motor Rating.
Field Coils and Maintenance.
Gears and Pinions.
Commutating Poles.
Alternating Current Motors.
Lists of Commercial Motors.
Insulating Materials.
Brush Holders.
Brushes.
Ventilation.
Gear Ratio Selection.
Characteristic Curves.
Motor Suspension and Transmission.
Commutator.
Armature Maintenance.
Bearings and Lubrication.
A. I. E. E. Standardization Rules on Railway Motors.
Comparison of Motor Capacity and Service Requirements.

V. Controlling Apparatus

Maintence of Control Apparatus.
Commercial Drum-type Controllers.
Multiple Unit Control.
Resistance Connection.
Field Control.
Power Operated Control.
Resistance Calculations.
Booster Control.
Types of Controllers.
Auxiliary Contactors.
Alternating Current Motor Control.

VI. Current Collecting Devices

Third-rail Collectors.
Trolley Maintenance.
Slot Plows.
Trolley Bases.
Roller Trollies.
Trolley Wheels.
Trolley Pressure.
Pantograph and Bow Collectors.

VII. Trucks

Classification and Description of Trucks.
Wheel Defects and Inspection.
Wheel Base and Track Curves.
Standard Wheel Dimensions.
Journal Bearings.
Axles.
Wheels.
Flange Lubrication.
Wheel Turning, Grinding and Mounting.

VIII. Braking

Coefficient of Friction between Shoe and Wheel.
Clasp Brake.
Electro Pneumatic Brake.
Magnetic Brake.
Weight Transfer in Braking.
Braking Distance.
Straight Air Brake.
Brake Inspection and Maintenance.
Hand-Brakes, Arrangement and Maintenance.
Electric Braking; Regeneration, etc.
Automatic Air Brake.
Brake-Shoe Suspension.
Storage Air-brake System.
Air Compressors.
Automatic Slack Adjuster.
Emergency Straight Air Brake.
Brake Rigging Calculations.
Brake Cylinders and Levers.
Hand Brakes vs. Air Brakes.
Shoe Pressure, Rate and Time of Stop.
Relation between Air Pressure, Piston Area and Leverage.
Brake-shoes and Shoe Heads.

IX. Rolling Stock

Car Weights and Operating Costs.
Standard Dimensions of Cars.
Electric Locomotives.
Height of Car Steps.
Car Lighting.
Track Sanders.
Cleaning Cars.
Center Entrance Cars.
Storage Battery Cars.
Train Operation.
Types of Frames.
Car Heating.
Double-deck Cars.
Typical City Cars.
Car Ventilation.
Rapid Transit Cars.
Interurban Cars.
Articulated Cars.
Motor Bus Operation.
Freight and Express Cars.
Couplers and Draft Riggings.

X. Transmission and Distribution

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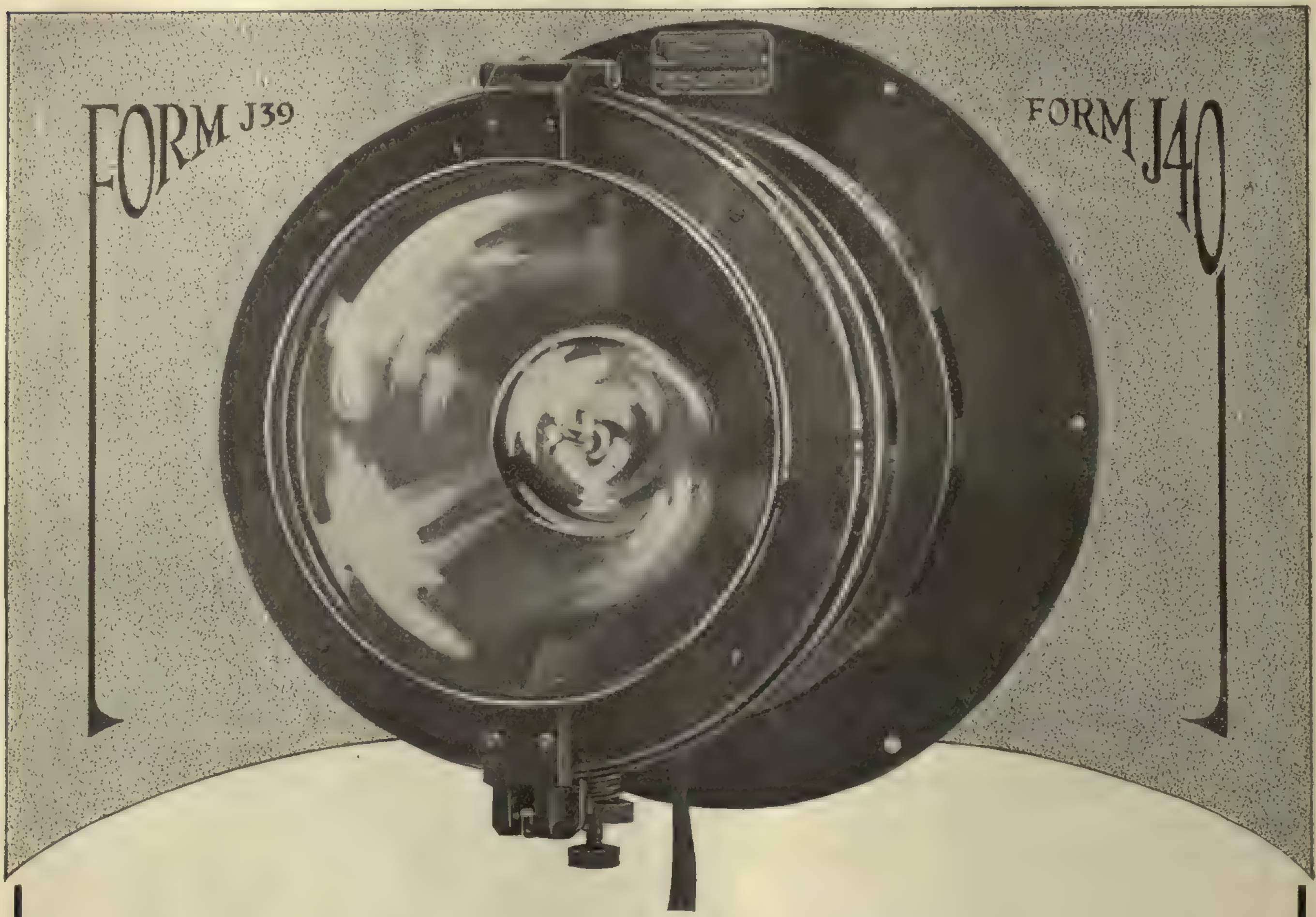

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ARE SPECIAL PEAK LOADS PROFITABLE?

The idea is widely held by the public that extraordinary peak loads are highly profitable to a modern urban electric railway system. Take the case of the recent World Series of baseball games and consider merely the traffic problem in the winning city of Boston. At first blush it would seem that the traffic to and from Braves' Field, about 3 miles from the center of the city and reached in part by a new and efficient subway line, would be a bonanza to the operating company. Forty thousand persons attended some of these individual games, but does this mean that the company profited to anything like the extent implied? Not a bit of it. This journal holds no commission from the Boston Elevated to minimize the value of such traffic, but let us consider a few pertinent points. In the first place, the company has invested something like $50,000 in a pre-payment station bordering the ball grounds, in order that the traffic may be expeditiously moved and with minimum possible interference to the travel on the adjacent main lines traversing the district. The annual charges on such an investment at say 8 per cent consume the entire revenue of no less than 80,000 carfares. These are covered in the course of a season probably several times over and need cause us little concern. The extra operating cost involved in the series, however, is quite another matter.

SPECIAL PEAK OPERATING EXPENSES

On account of the early travel to the field, it was necessary to inaugurate short-interval service on various lines early in the day and to hold many extra platform men for hours. It is possible that six hours' service might be required of say 300 men, and extra meals furnished by the company at a cost of perhaps $100. Extra station labor involved perhaps thirty to thirty-five extra employees, including special officers. To these should be added say twenty inspectors on the street, and crews had to be stationed at different points to handle any trolley wire failures, switch troubles, etc. Without any exact detailed figures before us, it is clear that the extra cost of handling the extra cars required (much of the traffic being long-haul business) might run up to $1,000 or more for a single game. To meet this outlay, 20,000 fares must be taken and the full total of such receipts applied to the extra cost, obviously an impracticable course. Furthermore, money must be expended on various minor car repairs after such a traffic peak, broken car windows being frequent, and the extra labor costs, it should be noted, include the expense of concentrating cars on temporary sidetracks near the grounds during the games. One more point may be mentioned, and that is that if there was no game a large proportion of the traffic would be handled by the company twice during the day anyway, many patrons of the game going directly from office to grounds and thence homeward at the close of the contest, so that the railway receives extra pay for only one haul. It does not require any very exhaustive calculations to show that even a World Series group of games may actually cost a company like the Boston Elevated money instead of pouring the fat surplus into the treasury which the passenger himself pictures as a result of the crowded grandstand.

TAXING THE POOR MAN'S CAR

Several thinking members of the transportation committee of the Chicago City Council, according to newspaper reports, have come to the conclusion that in Chicago the car rider does not get the full value of his nickel in transportation, and that, in the words of a certain cartoonist, "it's all wrong." They see no reason why the passenger should pay for street pavements, street cleaning, snow removal and other municipal services, instead of having such items charged against general and special taxation as in the East. Their conclusion is that the poor and middle classes which use the street cars are being taxed for the benefit of the rich users of autos and taxis which benefit from these street improvements but bear little part of the cost. Aside from the fact that taxing methods as regards electric railway companies are not so different in the East and the West as the examination of the Chicago aldermen on their recent trip to the Atlantic Seaboard apparently led them to think, the conclusion of the aldermen is not far wrong. If city legislative bodies could get the idea firmly fixed in their heads that the payment of paving charges by electric railway companies means the taxation of the poor man's car for the benefit of the rich man's auto, there would probably be a much fairer distribution of the burden. As we have many times pointed out, these taxes have been retained largely because it was thought to be easy to raise them in that way, but when they are added to the present cost of labor and materials in electric railway operation, the margin in profit in transportation practically disappears in the case of most railway properties. This means that these burdens will have to be removed and placed where they belong or passengers on electric cars will have to pay a higher fare than they do now. Adjustment of this matter has been too long delayed, and the time has come when present conditions rather than the practice of forty years ago should control the allocation of these charges.

SERIES MOTORS AS GENERATORS

In connection with the description of the regenerative braking scheme used on the Chicago, Milwaukee & St. Paul locomotive, published in our issue of Oct. 21, a question has been raised as to the propriety of saying that the main motor fields are "super-excited" while the locomotive is regenerating. In connection with this query attention has been directed to the fact that in general when a series motor is used as a generator the field terminals are reversed with respect to their connection with the armature so that the field flux may remain in the same direction when the current reverses. In the St. Paul engines, however, the fundamental principle herein involved is complied with, without mechanical reversal of the field terminals, as is explained below. The applicability of the term "super-excitation" is evident from the following facts:

When emf. is applied to the terminals of a motor, the armature automatically attains such a speed that, neglecting the resistance drop in voltage, a counter emf. equal to the line emf. is generated. As the only effective elements here are the speed and the field flux it follows that in any constant potential motor there is a definite field flux corresponding to a given speed. If at this speed the field flux is increased by any means, a point will be reached at which there is an exact balance of line voltage and counter emf. and no current will flow. Of course, under these conditions it will be necessary to supply mechanical power from some source to keep up the speed. If now the field flux is still further increased and sufficient mechanical power is supplied, the machine becomes a generator. This justifies the use of the word "super-excitation," which simply expresses the fact that, at a given speed and line voltage, more field flux is required when a machine is operating as a generator than as a motor.

In the St. Paul locomotive it will be remembered that for regeneration the field flux is held, by means of a motor-driven exciter, in the same direction that it had when the locomotive was drawing power from the line. The connections of the main and exciter circuits were clearly shown in the diagrams on page 892 of the issue referred to. The exciter is provided with two field windings, a shunt winding and a series winding, which series winding carries all of the power current and opposes the exciter field as the regenerated current increases. The exciter is out of circuit except when the machine is regenerating. As the armature and line current must reverse when the machine changes from motor to generator it follows under the latter condition that, although still connected in series, the armatures and field windings have currents in opposite directions. The exciter armatures form, as it were, a by-pass for the line current, shunting it around the field windings and at the same time supplying exciting current to the fields. Essentially, this is the same as reversing the field terminals.

The exciter, of course, does a great deal more than maintain the flux in the proper direction, as it absolutely controls the braking operation. The automatic control is adjusted to hold the exciter field current constant, and this with the reversed series ampere-turns of the exciter's field tends to give a constant braking effort at a given setting of the braking controller. The exciter further affords a most delicate manual control of the braking.

We have used a great many words to explain a simple matter, but as the equipment of the St. Paul locomotive is so unique and must, in future, be so frequently referred to as the pioneer application of d.c. regeneration on a large scale, the fundamental principles should be held clearly in mind.

MINIMIZING LINE TROUBLES

In the early days of interurban railroading the roads were short, and the question of transmission line troubles never bothered anybody very seriously. To-day, with the network of transmission lines necessary for feeding the substations of a large traction system and for supplying energy in many instances to outlying communities, line troubles may be matters of serious importance, not only to the railway company, but to its pole line neighbors as well. Such troubles are highly "contagious," and unless proper precautions are taken and proper protection provided, trouble caused by a faulty insulator, an accidental ground or a local thunderstorm may spread quickly to other parts of the system network.

For the localization of disturbances, and thereby the minimization of trouble as far as the system as a whole is concerned, it was brought out in a discussion at the last convention of the American Institute of Electrical Engineers that the isolation transformer has been used with gratifying success. This transformer has a one-to-one or other low ratio of transformation, and its function is to insulate sections of a network from each other while linking them together electrically.

Alternating-current lines belonging either to the transmission network or to a lower voltage distributing circuit, while operating satisfactorily as far as the actual transmission or distribution of power is concerned, often give trouble by causing noises in neighboring telephone circuits. With the increasing tendency of many railway companies to supply power to neighboring communities, the number of cases of such trouble in which railway men are interested has naturally increased. In many instances these cases of inductive interference can be remedied by better insulation and proper transposition of the telephone circuits. In other cases, as, for instance, when two wires of a three-phase circuit are extended to furnish single-phase service, the electrostatic unbalance which results sometimes produces noise troubles which no reasonable amount of transposition will remedy, and the use of an isolation transformer at the end of the three-phase circuit often offers the cheapest and best solution of the problem. The isolation transformer is by no means a panacea for all the ills that beset railway transmission networks and their interlinked distributing circuits, but it is felt that in the past its advantages have not been sufficiently emphasized.

How Are Complaints Handled on Your Road?

Would Your Patron Be Surprised if Greeted Thus?

IS it a fact that complaints from your patrons are welcomed?

And when a complaint comes in do you investigate it and satisfy the man who made it?

Is it your attitude that every complainant is per se a Pestiferous Person?

Or is it that EVERY COMPLAINT IS AN OPPORTUNITY to correct something that is wrong or to satisfy someone that the complaint is unjustified?

If the railway's attitude toward complaints is the right attitude—in other words, if it answers the last question in the affirmative—it should let people know that this is the fact, not to flaunt its virtues, but to encourage more complaints;

It should show the public that here is a road in connection with whose service it IS worth while to make a kick.

For about the most fatal thing for people to believe about any public institution is that complaints are ignored and that "it is no use to say anything."

This feeling has hurt all sorts of public utilities; it rankles in a man's mind to feel that he has been misused and is unable to secure redress.

A determination to get even some way is quite human.

On the other hand, A COMPLAINT COURTEOUSLY RECEIVED AND PROMPTLY REDRESSED USUALLY MAKES A STAUNCH FRIEND.

Complaints are so valuable that they should be advertised for; hotels and shops beg their patrons to complain when they are not satisfied; why shouldn't railroads do the same?

The man or men handling railway complaints and the Publicity Department should work so close together that no one can tell one from the other.

Without a publicity man a railroad doesn't know half of the time what's hurting it, and the other half of the time it doesn't care as much as it should about the public impressions that a publicity department will correct.

These Talks have discussed principally the general or common misunderstandings between the public and the utility company, and how to correct them.

Don't let thousands of individual grouches be added annually to the grievances, real or fancied, that the public holds as a group.

No railroad can afford to do this.

And for very much the same reasons no railroad can afford to be without a Publicity Department.

Such a department represents an investment in good will, from the lack of which railroads are suffering more than from any other one cause.

New Bonding Methods Developed for 150-lb. Third-Rail

Cast-Copper Bond and a Spot-Welded Joint with Copper Splice Bars Soldered to the Web of the Rail Are the Two Types of Bonds Used by the New York Municipal Railway Corporation

ALTHOUGH the total length of all bonds forms a small part of the length of the positive feeder layout of any railway system, still the bonds constitute one of the most important links of the power circuit, and a great deal of attention has been given them by the engineers engaged in the new rapid transit work in New York City. The purpose of this article is to describe the methods of installation of the two types of bonds which have been developed by the New York Municipal Railway Corporation and used by it for bonding the 150-lb. third-rail on its portion of the dual system of rapid transit.

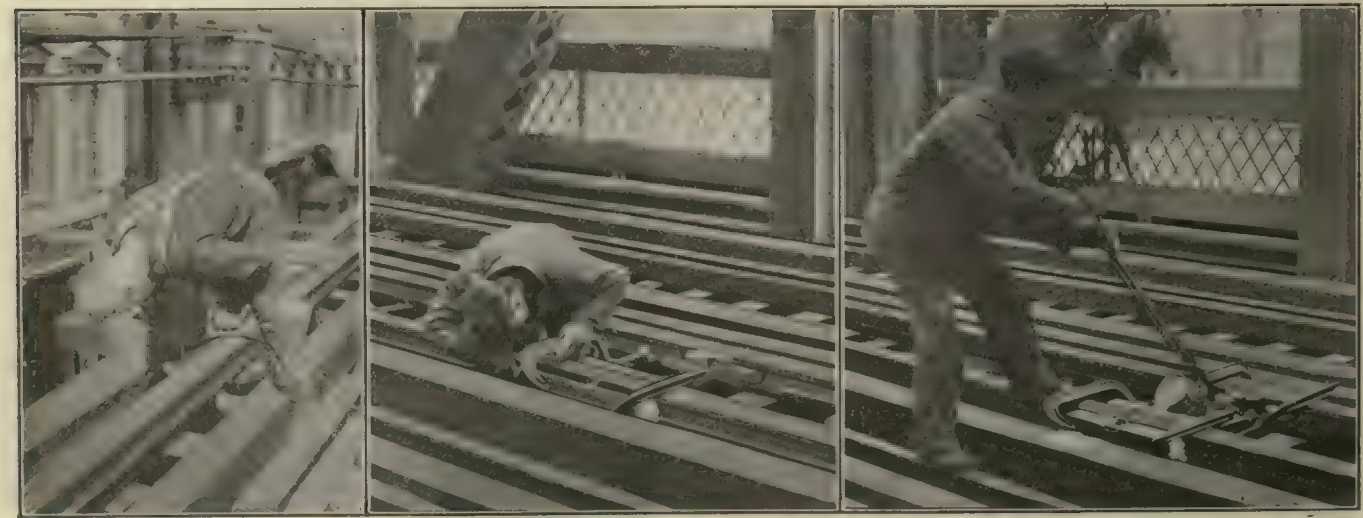
The shape of the rail, together with the heavy current and severe traffic conditions, required the development of a method of bonding different from any previously used. The thickness of the web of the rail is 2¾ in., and it was decided that this would not permit the use of a compressed terminal bond. It was also decided that any bond which projected below the base of the rail was undesirable because it would necessitate a special spacing of rail joints to avoid interference with the third-rail insulators and anchors.

THE CAST-COPPER BOND

The first bond developed to meet these conditions was a cast-copper splice which has been used for the bonding of about 75 miles of third-rail. The bond consists of two copper lugs, 5 in. in length, which are cast on the web of the rail. The joint thus formed will stand a tensile stress of 30,000 lb. without deformation and 60,000 lb. before fracture occurs. The electrical conductance of the joint is equal to that of an equal length of the unbroken contact rail, the conductance of this rail being about one-seventh that of annealed copper.

The accompanying illustrations show the steps in the installation of this bond. The surfaces of the rail which are to come in contact with the bond are first ground to remove the scale and rust and give a bright, clean contact surface. An electrically driven hand grinder is used for this purpose, the operation being done by one man in about twenty minutes. A carbon mold is then placed around the joint and held in position by two iron clamps, care being taken that the rails are in perfect alignment. After the mold has been placed, the cracks between it and the rail are filled with plaster of Paris. One man can place the mold and make it ready to receive the molten copper in about ten minutes. Instead of filling the cracks between the mold and the rail with plaster of Paris, a later practice has been to use a sand mold having a carbon lining. As soon as the mold is ready, the copper which is melted by a special furnace is poured into the mold, and after it has cooled for a few minutes the clamps and the mold are removed. Heavy lugs on each side of the bond proper are cast simultaneously with the bond itself and are for the purpose of heating the rail sufficiently to insure a perfect weld between the copper and the rail. That this is obtained is shown by the presence of a considerable amount of iron in the bonds that have been removed. After the joints have cooled, these lugs and other superfluous metal are cleaned off, and the bond is trimmed to the proper dimensions. The in-

THIRD-RAIL BONDING—COMPLETED CAST COPPER BOND



THIRD-RAIL BONDING—THREE OPERATIONS IN INSTALLATION OF CAST COPPER BOND: GRINDING THE RAIL, PLACING THE MOULDS, POURING THE COPPER

THIRD-RAIL BONDING—ELECTRIC FURNACES FOR HEATING COPPER ERECTED ON SPECIAL TRUCK HAVING THIRD-RAIL SHOE

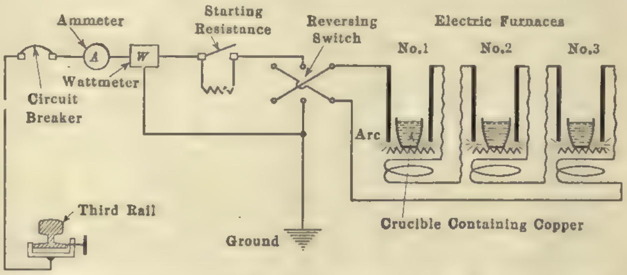
THIRD-RAIL BONDING—ELECTRIC FURNACES FOR HEATING COPPER BEING OPERATED IN SUBWAY WHERE CLEARANCE IS SMALL

stallation of these bonds was made by the Electric Railway Improvement Company, Cleveland, Ohio.

Furnaces for Melting the Copper

The furnace which was first used for melting the copper burned kerosene for fuel. In this furnace combustion was secured by discharging the vaporized oil through a small nozzle at a velocity sufficient to generate an induced draft of air. For the operation of one furnace a small air pump, operated by hand in the manner of an ordinary blow-torch, was sufficient to supply the necessary pressure for the oil. It was found, however, that the efficiency of this furnace depends on the quality of the wall material, since the volume and direction of the induced draft of air was affected by the deterioration of the walls of the combustion chamber. The difficulty in maintaining a proper furnace lining was one of the reasons which led to the use of the electric furnaces.

The electric furnaces are operated in batteries of three. One of the accompanying illustrations shows a battery of furnaces in operation in the subway where the space is limited. Another shows the furnaces and control apparatus installed on a flat car which is equipped with a shoe for taking the current from the third-rail. The method of wiring the furnaces is shown in the design reproduced below. The current enters each furnace through a long vertical terminal which holds a carbon rod that can be raised and lowered by a ratchet attachment. An arc is maintained between this rod and a bed of granular carbon on the bottom of the furnace. The current passes through this bed, through the second arc similar to the first and out by the long vertical terminal on the other side of the furnace. From here it passes through a coil around the base of the furnace, the object of the coil being to create a magnetic flux parallel to the arc for the purpose of steadying it. From this coil the current passes to the next furnace. The furnaces have an oval shape,



THIRD-RAIL BONDING—WIRING DIAGRAM OF ELECTRIC FURNACES

THIRD-RAIL BONDING—SPOT WELDING A JOINT WITH OXY-ACETYLENE WELDING TORCH

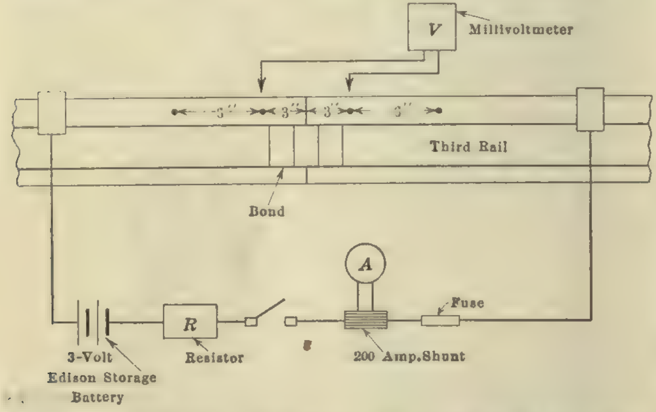
THIRD-RAIL BONDING—TESTING EQUIPMENT MOUNTED ON HAND CAR AND CONNECTED TO THIRD-RAIL and the crucible containing the copper rests on the bottom between the two arcs.

The operation of the furnaces is as follows: Before the current is turned on, all the carbon terminals are lowered until contact is made with the granular carbon bed. The current is then applied through the starting resistance, and the arc terminals are raised until arcs of proper length are obtained. The length of the arc is judged by the drop in potential across the terminals of the furnace, a voltmeter being provided for this purpose. When the arcs are established the starting resistance is short-circuited. The three furnaces are connected in series across a 600-volt circuit, and an average current of about 200 amp. is used. Heats can be made every thirty minutes.

The difficulties in obtaining pure copper and in getting satisfactory deliveries owing to the market conditions caused by the European war led to the development of the second method of bonding.

THE SPOT-WELDED JOINT

In this method two copper splice bars bolted and soldered to the rail furnish the necessary conductance, while the required strength and stiffness is obtained by welding the abutting ends of the rail together at the top and on the side of both of the bottom flanges. The mechanical strength of the bond is such that the rail can be raised 6 in. by a lever placed under the joint, and this operation can be repeated six or eight times without any sign of fracture appearing. The conductance obtained is greater than that of an equal length of unbroken rail. This method of bonding was described in the ELECTRIC RAILWAY JOURNAL for Aug. 12, page 282. Since that time it has been possible to obtain further details regarding the bonding process.



THIRD-RAIL BONDING—WIRING DIAGRAM OF TESTING EQUIPMENT

Before the welding operation is begun, the abutting ends of the rail are brought into alignment, and a temporary splice bar which fits the web tightly is clamped on each side of the rail. This holds the rails in alignment while the top weld is being made. After this weld is finished the clamps and the temporary splice bars are removed and the bottom flanges of the rail are welded. In making a weld, the operator first burns out the metal or cuts it away mechanically at the point where the weld is to be made and then fills up the space with Norwegian iron, which he melts off from a ¼-in. rod.

The welds can be made with either an electric arc or an oxy-acetylene blow torch. In the electric arc welding a d.c. generator driven by a small gas engine supplies the necessary current. The positive terminal is connected to the third-rail, and the operator holds the negative terminal in his hand. The arc is started by merely touching the negative terminal to the third-rail. The rails can be welded at the three points in about fifteen minutes. For the oxy-acetylene welds the oxygen is taken from one tank at a time, the hose pressure being about 60 lb. per square inch. Owing to the fact that an exceptionally large tip is used on the welding torch, the rate at which the acetylene is used is greater than with ordinary welding. For this reason three acetylene cylinders are used at once to feed the torch, about 6-lb. hose pressure being used. About 19 cu. ft. of oxygen and 21 cu. ft. of acetylene are consumed for each joint.

APPLICATION OF THE COPPER BAR SPLICE PLATES

After the rails have been welded together the next step is to apply the splice bars. These bars, which are the product of the American Steel & Wire Company, are made of copper, tinned with a heavy coating of hard solder. One of the bars for each joint is drilled in the shop and is used as a templet for drilling the rail and the other splice bar. Any rough projections that have been caused by the welding are cleaned off with a cold chisel, and the splice bars are placed on each side of the rail at the joint. They are held in position during drilling by two clamps. The drilling of the rail and one splice bar in a single operation while the other splice bar is used as a templet insures a true fitting of the bolt. The drilling of each hole requires about 20 minutes, a weak solution of soap and water being the only lubricant used.

The clamps and splice bars are then removed, and the surfaces of the joint which come in contact with the splice bars are ground until they are smooth and shiny. After being ground the abutting ends of the rail are heated until a bluish color appears by means of a kerosene blow torch having two burners. The splice bars are then heated while the rail is being tinned. This done, the bars are bolted in position with the heads of the bolts on the track side of the third-rail. Extra solder is applied through grooves in the splice bar provided for the purpose, and the bolts are tightened until the superfluous solder is forced out. About twenty minutes is required for the application of the splice plates. The splice and bond is then complete and ready for testing.

ELECTRICAL TESTS

The specifications require that the electrical resistance of the bond shall not be greater than an equivalent length of third-rail. The testing equipment comprises a two-cell Edison storage battery, a variable resistor made of carbon blocks, an ammeter with suitable shunt, and a line switch and fuse, all connected in series, and a millivoltmeter for measuring the drop in potential along the rail. By means of a wooden jig, punch marks are made on the side of the head of the rail 3 in. and 9 in. from the abutting ends. These punch marks are brightened up with a drill just before the test is made. The apparatus is then connected to the rail, and the current is adjusted to 200 amp. The drop of potential along 6 in. of rail including the bond is read and compared with the potential drop along the adjoining 6 in. of rail on either side of the bond.

The safety-first movement in Illinois is credited largely in the last year with having cut the number of accidental deaths by railways and electric lines 286, and the number of persons injured 1489. These figures are contained in the first annual report of the accident division of the engineering department of the State Public Utilities Commission. A comparison of the accidents on the electric railways for the years 1914 and 1915 shows a decrease from 188 killed and 2174 injured to 186 killed and 1246 injured.

The Public Relations of Public Utility Companies*

Honest Publicity Is a Sequel to Honest Action and Honest Purpose—The Proper Attitudes of the Utility and the Authorities Defined

BY JUSTUS I. WAKELEE
Associate General Solicitor Public Service Railway, Newark, N. J.

IN discussing the question of public relations, much has been said about publicity, and we are almost led to think that publicity is a remedy for all our ills. Of course, we want publicity, but it does not matter very much whether we want it or not, we get it, we live in it, we are surrounded by it. The very nature of the business brings it. This has always been so. In the past, when any utility corporation attempted to get away from it and conceal something, somebody was sure to let go a torpedo, and the dark place was opened. This is as it should be.

Honest publicity is certainly essential to proper public relations, but honesty of action and honesty of purpose are still more important. Therefore, publicity is not the beginning and end of our public relations. Utility companies, in addition to publicity, need more fully to develop a corporation character that, when known to the public by some proper scheme of publicity, will gain for them the public confidence to which they are entitled.

DIFFERENCES BETWEEN UTILITIES AND PRIVATE BUSINESS CORPORATIONS

Public utility corporations are different from private business corporations, although they have some of the attributes of the latter. Thus, they have stock privately owned. The stockholders elect the directors who manage the business. They own property which is just as much private property and entitled to the protection of law as the merchandise on the storekeeper's shelves or the furniture in your houses. The only difference is that the utility company has dedicated its property in the streets for public use, and it must be used within the undertaking. Right at this point is where many people go wrong. They think that because the property of the utility is in the street and is dedicated to the public use, somehow that property belongs to the public. This is not so. It belongs to the company, but it must be used in the street according to the undertaking of the company, and this brings us to the public side of these utilities. While they have some of the attributes of private business corporations, they also have some of the attributes of a public or municipal corporation. In furnishing transportation, gas and electric power to the people, they are rendering a service which is in a sense exactly the same as the city government renders in repairing the streets, maintaining markets and the like, except that the utility corporation usually does its work better and more economically and the utility cannot conceal bad management or increase the tax rates to make up for the losses. But the state has gone further than simply permitting these utilities to organize and do business. Many of the utilities have the power to condemn land in case the owner does not desire to sell. Then they have the right to use the public streets under certain conditions, and finally they are made practically monopolies.

The state, however, reserves to itself the power to compel the utility to carry out its agreement, to perform its undertakings and to furnish adequate, safe and proper service at reasonable rates. It also reserves to itself the right to say what is adequate service and what is a reasonable rate. Right here is another side track upon which many minds run. Many think that because the state has reserved the right to decide what is proper service and what is a reasonable rate, that the state has reserved the right actually to manage the property and dictate the use of the property, whether such is within the undertaking or not. My opinion is that because the state reserves to itself the right to decide upon the service and the rate, the state should recognize more fully than it apparently does the reciprocal duty to protect the corporation in the exercise of its legitimate functions. The companies because of their public character are entitled to such protection. As the companies have no right without a corresponding duty, they have no duty without a corresponding right.

THERE IS REALLY A UNITY OF INTEREST

I have pointed out the reciprocal rights and duties, and I have indicated the line-up—the directors and officers of the company on one side and the legislature, the public service commission and the municipal governments on the other. This is not a hostile line-up, however. The forces of the corporation are not going out to battle against the forces of the public, and the wise statesman will not lead the forces of the public against the forces of the corporation.

Let us go a step further and see whom the directors and the officers of the corporation represent, and whom the legislature, the commission and the municipal governments represent. On the side of the utility we find the owners of the stock and bonds of the company, all those who have money in the savings banks which invest in these stocks and bonds, all those who have policies of insurance in companies which invest in these securities. We find a great army of employees and their families and those depending upon them, and finally the customers of these utilities—those who take the gas or the electric current and who ride upon the cars.

On the side of the legislature and the municipal government, we find the very same people. Who are these people? In large measure they are those interested directly or indirectly in the securities of the public service companies. They are the employees and the families of these employees in public service companies. They are the patrons and users of these utilities. So, as we analyze the situation, the line between the corporation and the people fades away. It is one great army in which there are several officers, all of them having different duties.

WHAT IS THE PROPER ATTITUDE OF THE UTILITY TOWARD PUBLIC RELATIONS?

Now the question arises, if the utility companies carry out their part of the contract, properly perform their functions, what attitude should these utilities take upon the subject of public relations? The companies can control their own attitude upon this subject even if they cannot be influential in determining the attitude of the public. To bring about proper relations between the public and the company, I suggest two things: The first is for the utility acting through its officers and employees to do its full and complete duty, to fulfill its every obligation, and give the public adequate, safe and proper service at a reasonable rate. The second is for the utility fearlessly and publicly to demand its rights and insist that the other representatives of the people, namely, the legislature, the commission and the municipal governments recognize the right of the utility and give to it the protection to which it is entitled.

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*Abstract of an address presented at the company section meeting at Newark, N. J., Nov. 16, 1916.

When I said that the first requirement is for the utilities to do their duty, I do not mean that in any narrow sense. They should not wait until they are forced. I believe that utilities should, in a large way, take the lead in all matters along the lines of their particular business. They should develop. They should advance.

While the first requisite of public utility companies is to do their duty and fulfill their obligations, the second requisite is just as important. It is that the companies fearlessly and publicly demand their rights. The company should be firm and unafraid in putting forward its side of every question. When unfair demands are made, the reasons for refusing should be carefully and fully explained, but the unfair demands should be firmly refused. When bills are introduced in the legislature, as they are every year, the design or the effect of which would be to injure the utility, the companies would fail in their duty if they were not heard in protest and explanation. Whenever the interests of these companies are being discussed, they should be represented, whenever action is being taken which affects their welfare, whether in the courts, the legislature, the municipal councils or anywhere else, they should be heard. The people expect this and would not excuse failure brought about by lack of proper representation. It should not be overlooked, however, that the ability to carry out all this which I have called the second requirement depends upon the manner in which the companies carry out the first requirement. It is the fact that these companies are doing their duty which gives them the standing and the strength to demand their rights and protect themselves against attack.

Having in mind these contractual relations between the companies and the public and having described the parties to the contract and recognizing the necessity on the part of the company fully to perform their duty and fearlessly to demand their rights, I am ready to join the procession and advocate publicity as a final requisite to bring about proper public relations. In this country public opinion is the final authority. No institution can exist without the approval of the people nor can it long survive possible distrust.

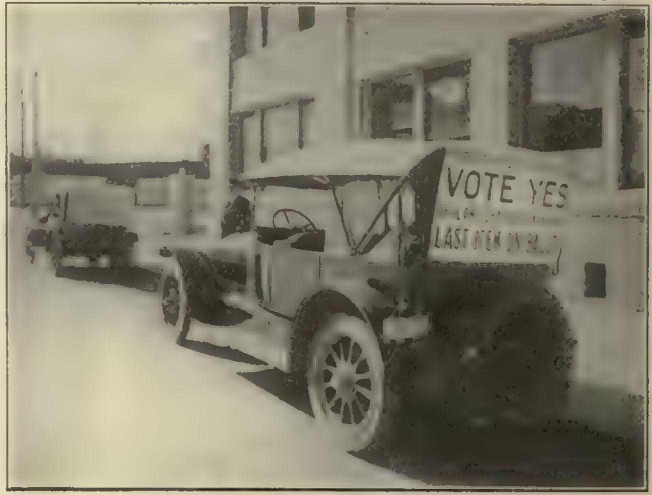
THE DUTIES OF THE OFFICERS AND EMPLOYEES

Now a word about ourselves, the officers and employees of these companies. What should our personal attitude be on these public questions? As I have met you men I have not seen any difference between you and the men employed in other occupations. Everybody I meet around here seems to be a normal human being. We spring from different races, we go to different churches, we belong to different political parties. This is as it should be. We are part of the people. Therefore, we should act as part of the people, and we should not permit ourselves to be put in a class by ourselves or to be treated as if our employment in these companies makes it impossible for us to act as other citizens. The best way to combat this idea is to let people know the facts. We can be the best publicity agents for our companies. We know these companies are honestly conducted, let us boldly stand up and say so. We know that these companies are not seeking a special favor of such advantage, let us not hesitate to make that plain to the people.

In conclusion, let us do our duty. Let us demand our rights. Let us take the public into our confidence. If we take this attitude fearlessly and maintain it we shall command the respect of the public, and, in addition, we shall respect ourselves and each other.

How the Public Helped

HOW the public responds generously when the problem of securing better public relations is well handled by an electric railway was clearly shown in connection with the recent adoption of charter amendments in Oakland and Berkeley, Cal., as noted in last week's issue. These amendments, in the nature of an enabling act making possible the adoption of a resettlement plan for the San Francisco-Oakland Terminal Railways, were passed by a three-to-one vote, largely owing to the interest of various civic clubs and the personal appeals made to the voters.



SIGNS ON PRIVATE AUTOMOBILES USED TO BRING OUT FRANCHISE VOTE IN OAKLAND AND BERKELEY

On election day friends of the amendments who owned automobiles were on hand to see that voters thought to be favorably inclined toward the measure were taken to the polls. Citizens wholly unknown to the company telephoned and offered the use of their automobiles. How some of these machines carried a message to the public is shown in the accompanying illustration.

Throughout the whole campaign the general public was on the side of the company, and this is believed to have been due to the publicity policy which the company followed in recent months. The public in operating and construction matters was taken into the company's confidence, and the result speaks for itself.

The National Research Council and the Bureau of Standards

The National Bureau of Standards has been asked to co-operate with the National Research Council in mobilizing the research facilities of the United States. This council was organized at the request of President Woodrow Wilson by the American Academy of Sciences, but Congress has made no appropriation to the Department of Commerce to enable the Bureau of Standards to participate in the work. The council comprises representatives of departments of the federal government, of engineering societies, of the research laboratories of industrial corporations and others. The aim is to make it possible for college and other laboratories to co-operate in the large research enterprises. In view of the increasing demand upon its facilities, as exemplified by the above, it is understood that the Department of Commerce will ask Congress at its next session for increased appropriations. Such an appropriation should receive the support of all who profit by the work of the Bureau of Standards.

Railway Commissioners Meet in Capital

Reports by New Public Utility Committees Overshadowed by Those Dealing with Question of Federal Versus State Regulation—Tendency Toward Centralized Control Attacked

ALTHOUGH the committee organization of the National Association of Railway Commissioners was expanded last year to provide for greater attention to problems affecting utilities other than steam railroads, the reports of the four new utility committees on rates, service, safety, and statistics and accounts which were presented at the annual convention in Washington, D. C., last week, occupied a quite subordinate position. Taken as a whole, they covered important points in utility regulation, but in most cases they were simply received and filed with little if any discussion. At practically all of the sessions, from Nov. 14 to Nov. 17 inclusive, the big topic of discussion was the inadvisability of exclusive federal control of interstate carriers and other utilities. The association was in general opposed to any abolition of the present dual system of regulation, and it favored legislation by Congress authorizing the courts to determine which is the reasonable rate in the case of conflict between federal and state commission orders.

PUBLIC UTILITY RATES

The first report of the other-than-steam railroad committee group dealt with rates. Although this specifically covered only electric, gas and water companies, it aimed to bring together in concise form the more important principles, theories and practices connected with utility rates. Starting with the fundamental statement that rates must be just and reasonable so as to produce a fair return on the fair value of used and useful property, the report stated that the total return should be such as to provide for the cost of economical and efficient operation, taxes, depreciation, a fair net return on the value of the property devoted to public use and a proper margin for the successful conduct of the business. The fair amount to be set aside for depreciation would vary with local conditions, and could be determined only by careful accounting for a long term of years. The composite life of the plant, determined from the probable length of life of its various parts, would give the percentage for a working basis, which should be subject to such modifications as experience required.

The fair rate of net return, the committee stated, would vary widely with local conditions. In general, the legal rate of interest might properly be taken as a standard of measure of the fair rate of net return to be distributed to the stockholders, but this might require modification to fit cases which were exceptional in the amount of risk connected with the investment. If a business was of a permanent and stable character, and free from irresponsible and destructive competition, the rate of net return might well approach that on bonds and savings-bank investments. On the other hand, when an exceptional element of risk pertained to the business, as in obsolescence of plant or obvious possibility of competition of other substitute service, a rate substantially above the legal rate of interest might fairly be allowed. The legal rate of interest is 5 per cent in three states, 6 per cent in thirty-one states, 7 per cent in eight states and 8 per cent in six states. The rate of net return allowed should be such that new capital would be available for the extensions and improvements necessary for the proper development of the business.

The committee felt that some allowance should be made in the rate of return authorized as well as in the rate of dividends distributed when necessary in order that the business might become firmly established with a substantial surplus within a reasonable length of time. Exceptional efficiency of management should receive consideration and encouragement. It was deemed a sound business principle worthy of general adoption "that decreased costs and increased profits due to skillful and wise management shall be shared in lower prices to the public and higher dividends to the stockholders."

The report was signed by Thomas W. D. Worthen, New Hampshire, chairman; M. H. Aylesworth, Colorado; Robert C. Bacon, Vermont, and John J. Treacy, New Jersey.

The discussion of this report concerned, in the main, lighting rates. It was suggested by a utility representative that "value of service" as a rate basis might well be considered to a greater extent, but the commissioners did not see how the question of service value entered the case if they knew what the term meant. In regard to the advisability of basing rates for municipal service on the same principles as those for private service, Commissioner Walter A. Shaw, Illinois, thought the plan all right in theory, but mentioned various snags in the form of ordinances, tax limits, etc., that would make it difficult in practice. The report was simply received without adoption and ordered printed.

PUBLIC UTILITY SERVICE

In the opinion of the committee on public utility service, patrons of a public utility are more dependent upon the public service commission in the matter of correcting unsatisfactory service than they are in the matter of securing reasonable rates. The report described the general features of commission work in checking and regulating service, and then discussed in detail questions arising in connection with different classes of utility service.

Taking up the electric railway group, the committee stated that the obligation of a local carrier to render adequate service at a reasonable rate is fundamental. What is adequate service and what is a reasonable rate, as applied to the different classes of service, are questions which cannot be determined by standard rules applicable to all classes. As to service, the problem of a smaller locality is different from that of a larger. Whereas in a smaller community the riding population can adjust itself to the carrier's schedule of service, if it fairly meets their needs, the larger community demands that the carrier adjust itself mainly to the requirements of the riding public, including the shifting of tides of traffic. In metropolitan and interurban service, the questions of rush-hour and non-rush hour traffic are intricate and difficult, owing to the great difference between the demands in equipment, motive power and labor of each class. Even the differences existing between the more extended rush-hour period of the morning and the restricted, more congested rush-hour period of the evening are factors which increase the difficulties. The use of the nickel as a fare unit, and the statutory provisions limiting the rates chargeable by railways, add other features to be considered.

In the opinion of the committee, the questions may be local in application, but they are extensive and country-wide in interest. The equipment used by street railways, both rolling and stationary, should at all times be in a safe operating condition. Nothing can excuse a disregard of this prime duty. The character of the equipment should be determined by capacity and traffic requirements. It is obvious that a fixed number of cars should not be prescribed without reference to the carrying capacity of those cars. In adopting a particular type of car, carriers should seek to provide additional seats rather than additional standing room.

The main elements in schedules of operation, the committee said, are (1) accommodation furnished by seats for passengers, (2) frequency of operation, and (3) limiting points of loading and traffic movement. The first two elements apply to service in all localities, the last element mainly to metropolitan operation. It is not sufficient to provide a comfortable riding place for each passenger boarding a street car, when he is obliged to wait for a car for so long a time as to result in inconvenience. Adequacy of service cannot be obtained where passengers have to wait an unreasonable length of time for cars. Of course, demands as to frequency of service may be unreasonable. Short of that, the public is entitled to liberal consideration, as encouraging more frequent use of facilities, assisting communal development and promoting the carrier's prosperity.

The rush-hour evil in large centers of population is one which, the committee thought, may not be easily eradicated. It may be minimized by routing and terminal facilities. Distribution of population through various routes and lines will relieve the pressure from particular lines. Avoidance of terminal congestion by methods of operation and trackage arrangement is also vital. Excess loading, however, is almost inevitable, but the degree of excess should be regulated. Carriers have sometimes asserted an absolute right to operate cars with a percentage of standees during rush-hour periods. Such a right does not exist. Excess loading can generally be prevented during non-rush hours, and if it cannot be avoided during rush hours it should be minimized.

Congestion at loading points, caused either by density of passenger traffic or by physical or track limitations, is a problem largely metropolitan. By providing a sufficient number of guards, controlling the course of ingress and egress, and using informative signals, a good deal of this trouble can be obviated. The adoption of traffic rules to regulate the movement of vehicles on streets is another means of relief.

Public service commissions are usually vested with authority to require reasonable extensions of mains or lines of various classes of utilities. Their powers with regard to street railway extensions, however, are limited on account of charter, franchise and property-owner rights. Yet, in the committee's opinion, the full benefits of regulation cannot be obtained without power in the commissions to require extensions of street railways in cases where the existing facilities do not go far enough. There need be no more apprehension as to whether this power would be exercised reasonably than there is now with reference to the power over gas, electric and water services.

In conclusion, the committee made the following general recommendations:

1. That the matter of regulating the service of public utilties, other than steam railroads, be vested (as is now done by many of the states) in the public service commissions of the various states.

2. That each state commission establish standards of service for each class of public utilities within its jurisdiction.

3. That inasmuch as some kinds of public utilties are not confined to state boundaries, some uniformity of standards is desirable, to the end that a single enterprise, doing business in several contiguous states, may not be required to observe a different standard in each state.

4. That each state commission prescribe forms, upon which the various classes of public utilities shall be required to keep a record of the important factors that indicate the character of the service of each utility.

5. That each commission establish and maintain a service division to inspect and from time to time determine the quality and character of the service furnished by the various public utilities.

6. That each commission recognize at all times the importance of adequate service to the public, and that it take such steps as may from time to time be necessary to insure the furnishing of adequate and efficient service by public utilities.

The report was signed by Richard Yates, Illinois, chairman; John M. Kinkel, Kansas; H. B. Shaw, Missouri, and Travis H. Whitney, New York, First District. At the conclusion of the report it was moved that the recommendations be adopted by the association, and it was so voted.

SAFETY OF OPERATION OF PUBLIC UTILITIES

The committee on safety of operation of public utilities reported that the subject covered such an extensive field that it probably could not be dealt with satisfactorily from the standpoint of discussion or recommendation. In its opinion, probably the corporations which have made the greatest advances in improving the safety of operation are the electric railway and the electric light and power corporations. It was the view of the committee that commissions should have full power and authority to make orders covering operating matters affecting safety whenever they seemed to be required. There are so many opportunities for corporations, however, to benefit financially and otherwise by making their operating conditions as safe as possible that the committee felt that the matter might be safely left with the utilities primarily, and that the work of the commissions should be principally devoted to investigating operating conditions, from time to time giving advice to the corporations with reference to such operations and making recommendations concerning them whenever it seemed proper to do so. If the corporations understood this to be the attitude of the commissions, there was no reason why there should be any friction between the interested parties. The report was signed by James O. Carr, New York, Second District, chairman; C. F. Foley, Kansas; R. W. E. Donges, New Jersey, and S. S. Kendall, Colorado.

After presenting the report, Commissioner Carr read a dissenting opinion by H. D. Loveland, California. Commissioner Loveland was of the opinion that to secure uniformity in the operating methods of various classes of utilities, it was often necessary that the initiative be taken by somebody having authority. It would appear, therefore, that the commission having jurisdiction would be the proper source for the initiation and formulation of rules having as an object the safety of operation, and that the co-operation of the utilities should be expected and required. Tentative regulations should be drawn up, conferences held with the utilities, etc., to the end that the final determination might be incorporated in an order specifying definite rules which would be reasonable and effective.

As a last word on the report Commissioner Carr then made the following statement:

"From our experience we believe that by co-operation with the corporations, and by suggestions, and as Mr. Loveland says by conferences, operating conditions will in nearly every case be so carried out as to produce safety for all who are interested, the public, the employees of the corporation and the corporation itself. It is going too far to require the commission to undertake to prescribe rules and regulations for the corporations. From my individual standpoint the commission has no right to tell the corporation how it shall conduct its business. It has the right to make orders requiring the corporation to do certain things, but when it commences to prescribe rules and regulations for the conduct of its business as such, I think it is going too far. The same result is accomplished by the order of the commission, and then the corporation can make its rules and regulations as it sees fit.

"The corporations have much more incentive to study the question of safety than any of the commissions can possibly have, because the corporations are the ones directly affected through their pocketbooks; and what affects them through their pocketbooks is likely to obtain quite careful consideration. Another thing which is tending to cause great strides to be made in this direction is the formation of the national associations of the various classes of public utilities. These deal with the subject in a broad way, and as the result of investigation and consideration adopt certain standards, which in turn are almost uniformly adopted by the corporations. In the event that the local corporations do not comply with the rules for safety which have been adopted as national standards, the commissions are in a position to bring the matter to their attention and urge the adoption of the standard rules."

At the end of the discussion it was voted that the majority and minority reports should merely be received and printed.

STATISTICS AND ACCOUNTS OF PUBLIC UTILITIES

According to the report of the committee on statistics and accounts of public utilities, there are now only eleven states which have not provided for publicity of accounts of electric railways. Nearly all the delinquent states are essentially agricultural, with relatively small urban populations. Of the thirty-eight states in which reports are provided, the commission in thirty-two is authorized to prescribe accounts and in twenty-six accounting classifications have been adopted. The newest utility brought under supervision is the bus company. At least five state commissions exercise jurisdiction over this service, but none apparently has yet prescribed accounting classifications. The form of report devised for street railways is readily adapted to the city autobus company and has given entire satisfaction thus far in New York City, which has one large bus corporation. Outside the large cities bus operations are on a small scale and a very simple form of report is said to be all that is required.

About one-half of the thirty-eight states requiring detailed reports of electric railways use the Interstate Commerce Commission's form in consequence of statutory enactments designed to prevent conflicting accounting requirements for interstate carriers reporting to both federal and state authorities. The inclusion of electric railways under such laws, the committee stated, was a mistake which has been rectified by amendments of the statute in some of the states, as in New York. In New York City, which is in the midst of a program of rapid transit extensions costing more than $350,000,000, the expenditures are being classified in accordance with the accounting system promulgated by the New York commission in 1908, six years before the Interstate Commerce Commission adopted a uniform system of accounts for electric railways. In the opinion of the committee it is hardly to be expected that the New York commission will revise its accounting regulations for the sake of removing some differences between them and the rules subsequently prescribed by the federal body, which has jurisdiction over one or two of the New York City companies and a small number of interurban companies outside the city. The intent of Congress, as shown in recent laws, to leave electric railways subject to state regulation must be recognized.

Most of the remainder of the committee's report was devoted to the subject of depreciation. In fifteen states there are special enactments requiring the utilities to maintain depreciation reserves or conferring authority upon the supervisory body to make such requirements. Seven additional states have exercised such authority as a matter of accounting just as the Interstate Commerce Commission has done, without any other authority than to regulate accounting procedure. These twenty-two states embrace most of those that supervise the purely local utilities like gas, electric and water companies. In fifteen other states, telephone and electric railway companies are subject to the requirement, either under federal or state regulations, while only nine states (besides Delaware and Utah, which have no state commissions) have not taken action so far, namely, Connecticut, Georgia, Kansas, Nevada, North Carolina, Oklahoma, Vermont, West Virginia and Wyoming.

In most cases the statutes go beyond the mere requirement of a depreciation account in that they confer power on the commission to fix the rates of depreciation and require the company to spend the money reserved for depreciation under regulations prescribed by the commission. A review of the action taken by the commissions under these statutes indicates that they are proceeding with caution in establishing rates and regulations as to the use of depreciation funds. In nearly every state orders have been issued only after thorough investigation in individual cases involving the determination of rates or the approval of security issues. Both the straight-line method and the sinking-fund method of computing depreciation are used—the former in nearly all cases in which reproduction cost is used as a rate basis, and the latter in many cases in which investment is taken as the rate basis.

The report then went on to say that the public interest which requires public supervision of utility accounting necessarily requires public determination of rates of depreciation. The commissions were therefore urged to ascertain and prescribe depreciation rates of individual companies as soon as possible, and, until such individual investigations had been completed, to require utilities to make depreciation charges at some minimum rate, which might approximate 3 per cent on the entire fixed capital of manufactured gas companies and 3½ per cent in the case of electric companies. Such a requirement, it was thought, would secure some degree of uniformity in a field where there now exists perplexing diversities.

Lastly, the committee approved the idea of an association of statisticians and accountants of public utility commissions. The report was signed by A. F. Weber, statistician, New York, First District, chairman; Arthur A. Lewis, Washington; Joseph B. Eastman, Massachusetts; B. W. Waltermire, Ohio, and Henry S. Lyon, statistician, New Jersey.

The action of the association on this report was confined to referring to the executive committee the section dealing with the organization of a separate association of commission statisticians and accountants, and that dealing with the question of federal commission jurisdiction over local utilities incidentally engaged in interstate commerce, and also to merely receiving the remainder of the report without adoption. Thus the proposal for minimum depreciation rates for gas and electric utilities was dismissed with only a short discussion. Commissioner Thorne, Iowa, stated that it was time for definite uniform accounting forms to be developed for all commissions, but that he would hesitate to commit himself to such principles as that of having uniform depreciation rates as suggested. Able steam railroad experts had testified that they were taking care of depreciation of freight cars out of repairs and renewals, in which case an allowance for a depreciation reserve would constitute an absolute duplication. A company that rebuilt its cars, charging the cost to operating expenses, would keep them in service for a longer period. If such a company were allowed to set aside the same amount for depreciation as a company which did not rebuild its cars, but abandoned them for new equipment, the proper depreciation treatment would not be given in both cases. In his opinion, the policy of each company would have to be considered before a commission could prescribe the proper rate of depreciation. Commissioner Walter A. Shaw, Illinois, believed that the commission should not be bound in any of their findings by the adoption of the report.

FEDERAL VS. STATE REGULATION

The first indication of the attitude likely to be taken by the association in the matter of federal versus state regulation came at the very beginning of the convention, when R. C. Prentis, Virginia, president of the association, in his opening address opposed exclusive federal control of interstate carriers. President Prentis said that there was an organized movement having for its ultimate object nothing less than the absolute elimination of the state commissions from all jurisdiction over interstate rates, and that the movement was inspired and fostered by the railroads. If the movement should succeed the work of the last thirty years in building up state regulation would be lost. The most serious complaint now made against the present dual system of regulation was the lack of uniformity, but it would not be wise to destroy the very agencies through which such uniformity as did exist had, in great measure, been secured. The great work of the association, he asserted, had been in promoting and securing uniform laws and regulations, and if the state commissions were shorn of their powers the cause of regulation would be hindered. President Prentis stated that the state commissioners would in the future, as in the past, unite their efforts with those of the members of the Interstate Commerce Commission so to amend the commerce act as to enable the latter commission the better to perform the service which the country desired it to perform.

In welcoming the state commissioners, Balthasar H. Meyer, chairman Interstate Commerce Commission, took up the question of co-operation between federal and state regulatory bodies and referred particularly to a conflict of rates arising in the "Shreveport" cases. He suggested what he believed to be a promising step in the direction of progress in railway regulation, namely, in Shreveport cases to provide by law for the co-operation of the state commissions and the Interstate Commerce Commission and thus to give their joint and co-operative efforts a definite legal status. Under such a plan the investigation would be conducted jointly by the state commissions and the Interstate Commerce Commission. Every state commission directly involved would be given an opportunity in accordance with law to participate in the deliberations and to assist in formulating the final conclusions upon a record jointly made. The one rate within the zone of reasonableness established through the joint efforts of the respective commissions would then apply to all business, state and interstate, and thereafter there could be no Shreveport case in that territory and with respect to that commodity.

The plea of Commissioner Meyer for co-operation in a matter where the courts have ruled the federal commission has the higher power, however, was not favorably acted upon by the association. Following a recommendation of the first of the general committees, the committee on state and federal legislation, the association adopted a resolution to the effect that for the settlement of disagreements between federal and state commissions, Congress should restore to the courts the power of saying what is a reasonable rate. The association almost without dissent favored the Sheppard bill, which provides that before a carrier may disregard a state rate in favor of a federal rate it must procure the decision of a court of competent jurisdiction holding the state rate to be unreasonable.

The committee on federal and state legislation, composed of L. B. Finn, Kentucky, chairman; Clifford Thorne, Iowa; H. F. Bartine, Nevada; P. W. Dougherty, South Dakota; H. T. Clarke, Jr., Nebraska; E. Northcott, West Virginia, and J. S. Harlan, Interstate Commerce Commission, made other recommendations, including one for the creation of subordinate regional commissions for the Interstate Commerce Commission. This was indorsed with a reservation of the right of appeal or review in proper cases. A proposal to amend the commerce act so as to give to the federal commission "the power to compel proper publicity as to the issuance of all securities made by interstate common carriers, however they may be authorized," was sent back to the committee.

CAPITALIZATION AND INTERCORPORATE RELATIONS

The elaborate report of the committee on capitalization and intercorporate relations, the second general report, which was somewhat in contradiction to the report of the committee on federal and state legislation, was read and simply received with little discussion. This report was signed by Edwin C. Edgerton, California, chairman; J. F. Shaughnessy, Nevada; W. C. Bliss, Rhode Island, and P. B. Trammell, Georgia. Judson C. Clements, Interstate Commerce Commission, concurred in the recommendation for federal control of the issuance of railway securities, and C. B. Aitchison, Oregon, concurred with the report in part and joined to bring it before the association. The full recommendations follow:

1. That the Interstate Commerce Commission have power to regulate the stocks and bonds of the interstate carriers.
2. That the Interstate Commerce Commission or some other federal agency be empowered to regulate the rates, practices, stocks and bonds of the interstate public utilities.
3. That Congress enact the necessary legislation to provide for a national incorporation act for interstate railroads and interstate public utilities.
4. That the Interstate Commerce Commission be empowered to exercise jurisdiction over mergers, consolidations and incumbrances of interstate railroads.
5. That the Interstate Commerce Commission have authority to exercise jurisdiction in receivership proceedings, preferably to the fullest extent, but at least over all matters relating to capitalization.
6. That federal and state statutes be amended, where

necessary, to permit the issuance by railroads and public utilities of a common stock without par value.

7. That the Interstate Commerce Commission and the state public utility commissions be permitted to invoke the aid of the Federal Trade Commission to determine the reasonableness of the cost of essential materials of railroad and public utility construction.

8. That adequate legislation be enacted, both national and state, to provide for voluntary wage agreements; methods of arbitration, and for federal and state intervention in emergencies, to adjust wage conditions in the railroad and public utility service; nothing contained in such legislation to require men to work against their will.

9. That such legislation as is consistent with the public interest be enacted for the enhancement of railroad credit and for the protection of American railroads against the competition in the American market for funds for private exploitation in foreign countries.

10. That a new committee be appointed to study the question of relationship between government and the railroads, to consider the possibilities of co-operation between the government and the railroads, and to report at the next annual meeting.

In connection with the last recommendation the committee cited the partnership agreements adopted in connection with electric railway resettlements as proper objects for study by the suggested committee.

VALUATION

The last important general report was that of the valuation committee. The attention of this committee had been entirely directed to the valuation of interstate carriers being made by the Interstate Commerce Commission, and to the various points in which the state commissions were particularly interested. In ultimate and legal effect, if not in nominal and immediate effect, the federal valuation was thought to be the touchstone whereby the lawfulness of all railroad rate systems, state or interstate, would be tested. When the principles applicable were determined, they would largely control analogous cases with respect to other public utilities, and the state commissions might find too late that the valuation principles were effectually settled for them in all matters relating to purely state commerce, and without their being heard except as they voiced their views in the present proceedings. The remainder of the report was taken up with a discussion of various points arising in connection with the federal valuation, the most important being that findings made under the valuation act are incomplete in so far as they fail to ascertain and report original cost to date as an element of value; that it is at least as practicable to estimate original cost, if company records are unavailable or unreliable, as it is for the engineer to estimate the present cost of reproduction (if anything within smaller limits of error), and that original cost should be the strongly controlling factor in the ultimate determination as to the weight to be accorded land values in a rate case. The report was signed by C. E. Elmquist, Minnesota, chairman; C. B. Aitchison, Oregon; Max Thelen, California; J. L. Bristow, Kansas; G. A. Henshaw, Oklahoma; E. C. Niles, New Hampshire, and W. A. Shaw, Illinois.

During the brief discussion on this report H. M. Edwards, New York Edison Company, one of the representatives of the National Electric Light Association, asked the co-operation of the association in formulating a glossary of valuation terms. The request was first ordered to be filed without printing but was later reconsidered and referred to the committee on valuation. The report was then approved and adopted.

SAFETY OF RAILROAD OPERATION

The committee reports in the steam railroad group numbered seven, but few contained points of interest to electric railways. The most important of these was the report of the committee on safety of railroad operation. This was devoted partly to a review of some of the causes which contribute toward the failure of materials, while another section dealt with railway signals and the problems involved in their use. In connection with the latter subject, the report stated that although there had been a comparatively rapid increase in signaling in this country, good standards of construction and efficiency in maintenance had not been overlooked, and very few accidents caused by failures of the signal system had been reported. On many roads, less than one "false clear" failure, or failure to indicate stop when necessary, to 1,000,000 signal operations, was a common record, while a record of one failure to clear, thus improperly indicating stop, to 25,000 signal operations was one easily maintained.

The committee noted that the continued and fairly uniform introduction of the block system had been followed by a steady decrease in collisions, but that although there are nearly 260,000 miles of railroad line in the United States, less than 100,000 miles are operated by the block system. Accidents continued to take place even on well-signaled roads, the committee said, and it seemed evident that something else was required to prevent such disasters. Yet automatic control of trains was a serious problem requiring careful consideration and extensive study of conditions on any road where it was proposed. Many devices had been submitted to the Interstate Commerce Commission, most of which were utterly impracticable. Some were worthy of additional development, and a few merited tests under railroad operating conditions. It was felt, however, that further development must rest with the railroads. While in some quarters it was said that the automatic control of the trains was wrong, it seemed wise to the committee, considering the present state of affairs, that a practicable system should be developed, ready for extensive use should it be finally decided that such a system was necessary. In its opinion, the best possible signal system should be installed and properly operated before it could be said that an automatic track control system was necessary.

The report was signed by C. C. McChord, Interstate Commerce Commission, chairman; R. C. Dunn, Florida; O. L. Owen, New Mexico; D'Arcy Scott, Ontario; F. M. Sheppard, Mississippi; C. D. Jackson, Wisconsin, and W. D. B. Ainey, Pennsylvania.

The report of the committee on grade crossings and trespassing on railroads (Thomas Duncan, Indiana, chairman), which was printed without signatures, formally placed on record the recommendations made last June at a joint meeting of the association and the American Railway Association. The recommendations for standard crossing signs then adopted were published in the ELECTRIC RAILWAY JOURNAL of Aug. 12, page 270. The present committee emphasized the fact that the presence and the uniformity of warning signs are imperatively demanded if accidents are to decrease. The only specific against disasters, however, would be the separation of grades. Additional powers should be given to state commissions to establish new highways. As to trespassing, the enforcement of laws requiring fencing of right-of-way and forbidding trespassing would reduce accidents, but the growth of public opinion was deemed the best solvent of the problem.

The election of officers for the association resulted in the usual promotions. Max Thelen, California, was made president; Edward C. Niles, New Hampshire, first vice-president, and Charles E. Elmquist, Minnesota, second vice-president. W. H. Connolly, Interstate Commerce Commission, remains as secretary, and James Blaine Walker, New York, first district, as assistant secretary.

Conferences and Commission Rulings Following Boston Drawbridge Accident

Mayor of Boston Holds Conferences to Consider Safeguarding and Has Called Another for Nov. 27—Commission Orders Positive Stops at Drawbridges on Massachusetts Railways but Recommends No Automatic Devices at Present

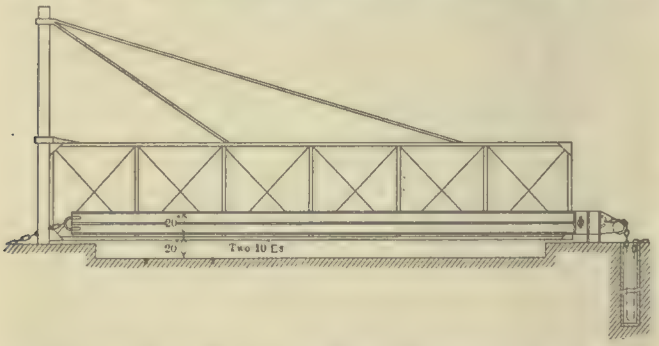
FOLLOWING the accident at the Summer Street drawbridge over the Fort Point Channel in Boston, on Nov. 7, in which a large number of street car passengers were drowned, the subject of safeguarding at drawbridges has been studiously considered by the city authorities, the Public Service Commission, the railway management and others more or less directly interested. The story of the accident was related in the issues of the ELECTRIC RAILWAY JOURNAL for Nov. 11, page 1034, and Nov. 18, page 1074. The situation was commented upon editorially in the latter issue, page 1048.

Mayor Curley's Conferences

At the invitation of Mayor Curley of Boston, Mass., a conference on drawbridge operation was held at the Boston City Hall on Nov. 16, the meeting being attended by George W. Bishop, head of the Inspection Department, Massachusetts Public Service Commission, President M. C. Brush of the Boston Elevated Railway, Henry E. Reynolds, assistant general manager of the Bay State Street Railway, Prof. C. M. Spofford of the Massachusetts Institute of Technology, Commissioner of Public Works Murphy, and about fifty engineers associated with local utilities, city service and private firms. In opening the meeting, Mayor Curley said that the primary object of the gathering was to consider methods of preventing accidents at drawbridges similar to that at Fort Point Channel on Nov. 7, when a surface car of the Boston Elevated Railway went through the gate and was precipitated into the harbor with heavy resulting loss of life.

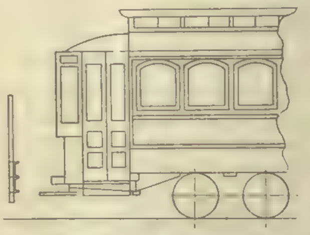
Devices for Preventing Drawbridge Accidents

Various suggestions relative to accident prevention were outlined by the Mayor from communications received since the particular accident in question. These included the installation of a trolley switch actuated from the drawtender's cabin and designed to cut off the current supply whenever the draw is open; a motor-driven girder designed to interpose a solid barrier whenever a gate is closed; increasing the distance between the edge of the draw from present low limits of 15 ft. and 25 ft. to 75 ft. minimum; the use of sirens, gongs, and illuminated signals. Reference was also made to a rigid stop which has been in successful use against teams and automobiles on the Boston ferries during the last two years.



LINDALL'S SAFETY GATE WITH CHANNELS, CHAIN WELL AT RIGHT

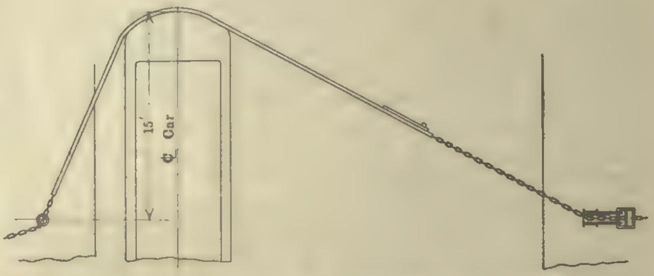
Following the Mayor's outline of the principles involved in the suggested safeguards, President Brush said that the Boston Elevated Railway is of the opinion that there should be eventually constructed at all drawbridges an absolutely positive barrier which will prevent street cars and all vehicles from reaching the edge of the draw; and that this barrier should be of a nature to stop vehicles with as little injury as possible to individuals and should be at a point not less than 75 ft. from the edge of the draw. Such a barrier must positively be so interlocked with the bridge mechanism that it is an impossibility to operate the draw until the barrier has been positively closed and locked. All the schemes outlined below should be installed pending the final construction of such a barrier, and should be applied with the latter.



ANTI-CLIMBER AND GATE REINFORCEMENT

Scheme Devised by John Lindall

A car stop for drawbridges designed by John Lindall, superintendent of rolling stock and shops Boston Elevated Railway, and shown in the illustrations on this page, was then exhibited in working model form. This arrangement consists of reinforcing the drawbridge gate with two 10-in. channel irons to stiffen the gate and prevent climbing, the free end of the gate being provided with a heavy steel chain or cable carried around a pulley into a well sunk at one end of the gate. The chain is looped around a series of steel bolts in the well, the end finally being secured to a rigid attachment at the top of the well. When a car strikes the gate, the latter may bend as it receives the impact of the bumper, but if the car pushes the gate outward, shearing off the bolts in succession from the bottom of the well upward, the car will be brought to a gradual stop through the shock absorption thus secured.



LINDALL'S SAFETY GATE BENT UNDER THE IMPACT OF THE CAR

Mr. Brush said that this stop had been designed by Mr. Lindall since the Fort Point channel accident and that the company has every reason to believe it will prove practical. Another gradual stop, a counterweighted flexible gate safety device, has been worked out by David Curtin, chief engineer maintenance of way Bay State Street Railway. To consider these designs and all other suggestions available, Mayor Curley appointed an engineering committee headed by Prof. Charles M. Spofford, and including representatives of the Boston Elevated Railway, the Boston Edison Company, the Bay State Street Railway and other organizations, which will report its conclusions at a general meeting to be held on Nov. 27. John Carty of the Public Works Department, 602 City Hall Annex, Boston, was named as secretary and was empowered to receive in writing all available suggestions.

President Brush's Recommendations

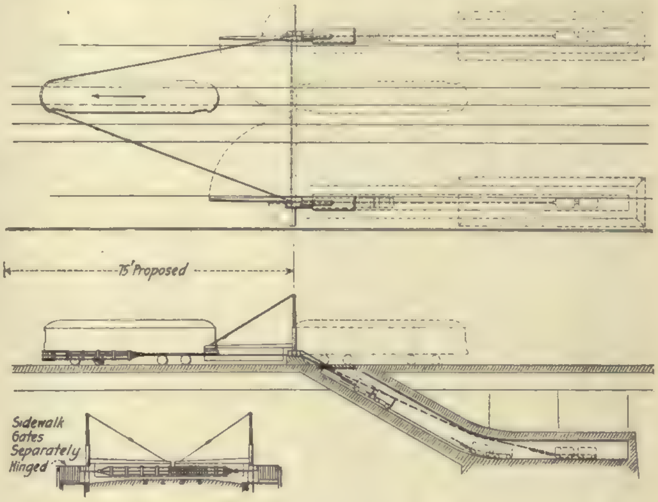
Following the exhibition of the car stop designed by Mr. Lindall, Mr. Brush vigorously emphasized the danger inherent in the use of any rigid stop against which any vehicle is operated at high speed, pointing out that the passengers cannot be properly safeguarded by bringing a car with kinetic energy of more than 2,000,000 ft.-lb. to an instantaneous stop against a rigid body. A positive bumper is at present in service on the private right-of-way of the company's East Cambridge Viaduct, but the drawtender is not allowed to open the draw and raise the bumper until a car is standing within about 100 ft. of the bumper. On the Charlestown Bridge a third track for elevated trains is now being installed between the two running tracks north of the draw, and the switch leading to this track is interlocked with the draw so that a train cannot approach the bridge on the main line track southbound from City Square without being deflected upon the emergency track. The latter ends in a pebbly surface which will stop an eight-car train at a safe distance from the bridge opening. At the interlocking tower south of the Charlestown Bridge, the main line switches connected with the northbound bridge track have been interlocked with the bridge-operating mechanism so that the draw cannot be opened unless these switches are set to carry trains past the bridge track entrance whether such trains are coming from the North Station or the Atlantic Avenue elevated line.

The company believes that pending the construction and installation of positive barriers immediate steps should be taken to paint the present gates of all bridges white with black stripes; that one or possibly two red lights with large lenses should be installed on all gates directly between the rails at an agreed-upon distance above the highway (such lights to be under the control of the drawtender); that there should be installed signs 100 ft. and 200 ft. respectively from the gate indicating "Slow" and "Stop," for the guidance of motormen, when the draw is open; that these signs should be not less than 36 in. long and 12 in. wide; that there should be immediately installed at each drawbridge a large gong, electrically operated, interlocked with the bridge mechanism so that it will be impossible for the drawtender to open the bridge until he has closed the switch which actuates the gong, the latter to ring as long as the bridge is open as a warning to all vehicles.

"The company further believes," said Mr. Brush, "that an ordinance should be passed prohibiting any vehicle standing on a track directly in front of a street car, while drawbridge gates are closed, in such a position as to obscure the view of the red light placed on the gate for the guidance of the motorman. None of these precautions other than the installation of the positive barrier itself will prevent vehicles dropping into the draw in cases where the operator has lost control of his vehicle."

David Curtin's Safety Device

At a later meeting of the committee appointed by Mayor Curley to investigate practicable means of increasing safety of operation at drawbridges, David Curtin, engineer of maintenance of way, Bay State Street Railway, Boston, submitted drawings of a suggested flexible gate safety device as shown herewith. In brief, this device consists of a flexible gate connected to a system of counterweights in such a manner that a runaway car striking the gates automatically brings into action the operation of the counterweights. Across the front of the gate, facing the approaching car, steel cables are stretched, the space immediately before the track being provided with a heavy wire or cable mesh to prevent climbing or shearing of the car body. The first shock of the impact will be taken care of by the flexibility of the gate and cables. At each end of the gates a cable is carried past a suitable support to two or more counterweights located on a track at the bottom of a chamber below the street surface. A series of heavy springs attached to the cable ahead of the counterweight will further lessen the impact and retard the speed of the car, finally bringing the counterweight into action. The weight of the counterpoise and the gradient of the incline determine the rate of retardation and consequently the time and distance during which the car will be brought to a stop. After the counterweights have run a short distance upon the track it is intended to discontinue the latter and to allow the counterweights to slide forward and upward on two rails with narrow spacing laid in the center of the channel. A hydraulic plunger may be used in extreme cases, as in connection with drawbridges at the foot of grades.



CURTIN'S STOP FOR SAFEGUARDING AT DRAWBRIDGE

Finding of the Commission

The Massachusetts Public Service Commission issued a finding on Nov. 21 relative to the accident following an exhaustive investigation of the circumstances by the inspection department of the board. In general, the condition of the car was found to be satisfactory and the commission devotes itself mainly to the discussion of preventive measures.

Report of Inspection Department

George W. Bishop, chief of the inspection department, submitted an extended report to the board on Nov. 14 which is quoted in full in the finding. After noting the departure of the car from the P Street carhouse in South Boston and stating that nothing unusual in its operation was observed prior to the drawbridge approach, the report states that the motorman in charge suddenly discovered that the warning gates were across the street and the drawbridge open. The motorman claims to have immediately applied the brakes and reversed the current, but the car was so close to the gates, which were only 25 ft. from the opening, that the car crashed through the gates and went into the water. The motorman, who was saved, estimated the speed of the car at the gates to have been 8 m.p.h., while a passenger standing on the front right hand step at the time estimated the speed at 15 m.p.h. This person stated that he fell as he jumped from the car to the street, but soon recovered himself and assisted in removing a man from the water.

Many conflicting statements concerning the accident, undoubtedly made in good faith, have reached the department. In some cases these have proven helpful, in others not. The department has interviewed the conductor and motorman, as well as surviving passengers and persons who were near the scene of the accident when it occurred, and has secured all available information concerning it. The Boston Elevated Railway and the bridge department of the City of Boston have freely given all information requested concerning the operation of the railway and the drawbridge.

After the car had been raised from the channel all of its parts were thoroughly examined by Assistant Inspector Philip Scott. The following is an extract from his report concerning the condition of the car:

"After a careful inspection of control, trucks, sand boxes and brake rigging, I am of the opinion that the car was in good working condition up to the time of the accident and that all damages to the car and equipment occurred as the car went over the draw."

Inspector Scott also found that this car received a regular inspection on Oct. 31, 1916; that the brakes were adjusted during the afternoon of Nov. 7, and that this was the first trip thereafter. Mr. Bishop states that he is unable to learn from any source that the brakes were not in proper working condition; in fact, there is sufficient evidence to show that they were working and that the car skidded. The condition of the track approaching the draw opening was, soon after the accident, found to be favorable for the safe operation of cars. The track on the bridge and for a distance of 200 ft. easterly of it is a tangent and nearly level.

TESTIMONY OF THE CAR CREW

A stop sign, about 17 in. long and 4.5 in. wide, with letters, 2 in. x 3 in., suspended to a span wire 20 ft. above the rail, is located easterly about 175 ft. from the gates and 200 ft. from the draw opening. This sign was installed at this point, according to the company, for the purpose of bringing all cars to a full stop before reaching the drawbridge. Mr. Bishop is of the opinion that to have served this purpose effectively, a much more conspicuous sign, visible both by day and by night, should have been located not more than 50 ft. from the draw opening. The motorman states that he did not make the stop on this run; that he only slowed down sufficiently for a man to board the car and proceeded without receiving two bells from the conductor. This failure to stop was a violation of the rules, the observation of which might have prevented the catastrophe.

The statement of the conductor, who had been in the service of the company sixteen months, shows that he was in the car collecting fares from the time he left the Boston Edison plant in South Boston until the car reached the bridge and did not notice anything unusual in its operation until it struck the gates, when he reached the rear door and jumped. The conductor was apparently unable to fix the rate of speed of the car or to state definitely whether or not the car made a stop at the stop sign above mentioned. A street arc light is located about 25 ft. easterly from the draw opening in the bridge, between the tracks, and nearly opposite the gates. This light, if kept burning at night, is of great assistance to the motorman in determining the position of the draw. The motorman in charge of the car claims that this light was not burning at the time of the accident. His statement is substantiated by a passenger on the car, as well as by a person riding in an automobile, who arrived immediately after. There is further evidence that later in the evening the light went off and came on again.

The channel drawbridge is maintained and operated by the city of Boston. Mr. Bishop says that he is unable to find any good reason why the gates should not have been placed 50 ft. or 75 ft. from the opening instead of 25 ft. to give persons using the street earlier warning when approaching danger. Such warning would have been valuable to the motorman operating the car involved. Measurements on five other drawbridges in Boston show that the distance of the gates varies from 23 ft. to 69 ft. from the opening, indicating a lack of uniformity, which is so much to be desired. The red lantern used on the gate at the place of the disaster is attached to the right hand gate on the side toward the channel, so that its iron work is somewhat obscured by the ironwork of the gate as one approaches. A better practice would be to provide two lanterns for these gates, the additional one to be placed over the street railway tracks and both to be hung on the side of the gates toward which persons are approaching rather than on the channel side. The motorman claims not to have seen the red light. The man in charge of the draw says it was in place at the time of the accident. Other conflicting evidence appears relative to this light, which may have been obscured by teams even if in its designated place.

SUGGESTIONS CONSIDERED BY INSPECTION DEPARTMENT

The seriousness and magnitude of this accident are such as to call for co-operation, due consideration and prompt action by all persons directly or indirectly responsible for the maintenance and operation of drawbridges and of street cars operated over them. Among others, four suggestions, none of recent origin, which have reached the Inspection Department, with the object of preventing a repetition of this accident are commented on by Mr. Bishop as follows:

1. *Reduction of Speed of Cars Approaching Drawbridges.* This method leaves the matter to the judgment of the motormen and conductors to estimate the rate of speed at which a car is moving, the results of which often prove unsatisfactory.

2. *The Installation of Automatic Electric Signals.* This method is both practicable and feasible. However, to be effectual, they must be connected with the drawbridge in a manner that will require the signals to be set in danger position before the draw is opened and remain in that position until the draw is closed. This requires the approval of municipalities and creates a joint responsibility in the maintenance and operation not altogether desirable.

3. *Installation of Derails.* This method is possible but in my opinion most undesirable in public ways. To make a derail effective it must be connected with the drawbridge and the signal to protect the derail must be placed a proper distance from it. This combination should be so connected that to open the draw the signal

must first be set at danger, when the derail may be set in position to throw a car from the track. After this, the draw may be opened. A reverse movement of draw, derails and signals will clear the track for traffic. I consider the derailing of a car in a public street dangerous. There is no assurance of the direction the car will move or the results it will produce. It is just as liable to do one thing as another. It may overturn; it may go upon the sidewalk; it may collide with pedestrians or teams using the street at the same time; and in either event something serious is liable to happen.

4. *Installation of Positive Stops.* This method may have some objections, but it is free from the complications mentioned in Nos. 2 and 3. The management of street railways may install positive stops along their lines whenever in its opinion public safety so requires. It is always safe to stop a car provided it is properly protected when at rest.

Mr. Bishop is of the opinion that the fourth method is preferable and that with proper supervision and discipline on the part of the management it is reasonably safe. It may be put into operation at once and without great expense. He therefore recommends that every street railway company in Massachusetts operating cars or trains over drawbridges shall at once install positive stops not more than 100 ft. nor less than 50 ft. from each draw to protect traffic going in either direction, and shall erect at each stopping place a stop sign visible by day and night, the type of sign and rules governing its use to be approved by the commission.

CONCLUSIONS OF THE COMMISSION

The suggestions in Mr. Bishop's report in regard to the location and illumination of highway gates used in the protection of drawbridge openings relate to matters over which the commission has no jurisdiction, for such gates are operated and maintained by the municipal authorities. The board has been informed, however, that the city of Boston is considering steps for the improvement of existing conditions. It is greatly to be hoped that equally prompt and effective consideration may be given to the subject by other municipalities controlling drawbridges. With the recommendation made by the inspection department in regard to street railway operation, the commission is more directly concerned. For many years the Massachusetts law has required street railway cars to make positive stops at steam railway grade crossings, and the statute imposes a penalty upon any motorman or company violating its provisions (Statutes 1906, Chap. 463, Part 3, Sec. 82). In the case of drawbridge openings no similar statute requires such a practice, nor, with certain exceptions, does it appear that it has been voluntarily adopted by the companies themselves. The rule of the Boston Elevated Railway in regard to safety stops makes no mention of drawbridges. While in the case under consideration it happened that such a stop had been established at an intersection street about 200 ft. from the drawbridge opening, no similar stop had been established upon the other side of the opening. Further, the stop sign was not well located nor particularly conspicuous, and there is little evidence that the company has ever attempted effectively to inforce the rule in question.

While a uniform rule that positive stops be established wherever drawbridges are located would to some extent interfere with the expeditious operation of cars, the commission is convinced that safety considerations far outweigh any embarrassment which the companies or the public might suffer from this cause. An order to this effect therefore has been issued. No such order, the commission declares, will accomplish the results desired unless the positive stop rule is rigorously enforced by the companies through adequate penalties for the infraction of this rule by employees of the company.

It has frequently been suggested that some mechanical means should be adopted for bringing cars automatically to a stop at drawbridge openings, so that safe operation may not depend entirely upon the human element. The inspection department, however, after the careful study of this question, is unable at the present time to recommend to the commission any such device for use in surface car operation whose disadvantages are outweighed by its advantages. Many such devices, however, are in process of development, and it is possible that the department in the near future will find itself in a position to review its present findings and recommend the adoption of such an automatic stop. The subject will continue to receive the attention of both the department and the commission. For the immediate present the requirement that positive and habitual stops be made by the motorman at all drawbridge openings seems best to meet the needs of the situation.

The possibility of occasional infractions of this rule, however, seems to make it necessary to provide for additional safeguards. If in this case the gates had been installed a reasonable braking distance from the draw opening the accident would undoubtedly have been averted. The commission is therefore of the opinion that every street railway in the State should lay this matter before the proper municipal authorities and endeavor to secure the location or relocation of gates at a proper distance from such drawbridges. It is desirable, also, that such gates should be painted with alternate black and white stripes. These gates should also be provided at night with red lights, located at reasonable intervals along the upper portion of the gate, and should also be interlocked with the bridge machinery so that the latter cannot be operated unless all gates are closed. It is possible, however, that in some cases it may not be feasible to locate or relocate drawbridge gates in the manner indicated. In such cases the commission is of the opinion that the companies, with the necessary consent of the municipal authorities, should install and maintain at a suitable distance from each end of every drawbridge a smashboard signal or similar device so interlocked with the operating mechanism of the draw span as to make it impossible for the draw tender to open the draw before the smashboard is in proper position. The impact of this device upon the car body would arrest the attention of the motorman and convey the warning in season to avert an accident. The question as to whether the positive stop shall be retained after drawbridge gates or smashboard signals have been installed to the satisfaction of the commission is reserved for future consideration.

In the present instance there is no evidence that the accident was due in any way to defective brake equipment, or to the presence of passengers in the front vestibule of the car. On the contrary, the evidence indicates that the brakes, while of the hand-operated type, had recently been inspected and were in good working condition. While there is no reason to believe that air brakes would have averted this accident, the general superiority of air brakes to the hand-operated type, as applied to double-truck cars, is well established. It is also true that many companies have found it desirable to adopt a rule positively excluding passengers from the front vestibule. In order that every reasonable precaution may be taken to prevent accidents in the future, the commission will take up these two matters in the near future at public hearings, at which all companies may have an opportunity to express their views.

ORDERS RESULTING FROM THE INVESTIGATION

Every street railway in Massachusetts operating cars or trains over drawbridges on surface lines shall at once establish positive stops at a reasonable braking distance from each drawbridge, subject to the approval of the commission, to protect traffic going in either direction, and shall erect at each stopping place a stop sign visible both by day and night, the type of sign and rules governing its use to be approved by the commission.

Every such company shall make seasonable application to the proper municipal authorities for the location or relocation by such authorities, at a reasonable braking distance from each end of each drawbridge, of suitable gates, painted with alternate white and black diagonal stripes and provided at night with red lights located at reasonable intervals on the upper portion, such gates to be properly illuminated and interlocked with the bridge machinery so that the latter cannot be operated unless all the gates are closed.

Wherever, for any reason, it is found impracticable to secure such location or relocation of drawbridge gates, every such company, provided the necessary consent is obtained from the proper municipal authorities, shall install and maintain, at a reasonable braking distance from each end of each drawbridge, a smashboard signal or similar device so interlocked with the operating mechanism of the draw span as to make it impossible for the drawtender to open the draw before the smashboard is in proper position.

Labor Disputes and Public Utilities

Academy of Political Science Listens to Addresses on Government Mediation and Compulsory Arbitration—Labor Leaders Oppose Legislation to Secure Industrial Peace

ONE of the most pressing questions of the day has to do with the means that can be adopted in the United States to secure and maintain industrial peace. In view of this fact, it was very appropriate that the Academy of Political Science, at its annual meeting in New York City on Nov. 22-23, should have devoted its entire time to addresses and discussions on the general subject of public utility labor disputes.

As a perusal of the following abstracts will show, this main subject was attacked from the points of view of what has already been accomplished in this country and abroad in the line of governmental mediation and arbitration, and what the unions think of compulsory arbitration, or even of governmental investigation with mediation and conciliation. Some speakers felt that compulsory arbitration had been successful in foreign countries in restricting strikes, but were of the opinion that the time had not yet arrived for arbitration to be enforced here by legislative enactment. On the legal side it was thought that the restricting of the right to strike through criminal penalties was constitutional, but the union representatives frankly opposed the compulsory principle as a violation of the rights of labor under the Thirteenth Amendment, and asserted that compulsory arbitration could not be enforced. In general, there was a strong plea for machinery to fix standards for wages, hours and working conditions.

GOVERNMENT MEDIATION AND ARBITRATION

The first address at the opening session on Wednesday afternoon was by William L. Chambers, United States commissioner of mediation. Mr. Chambers stated that two factors have been responsible for anti-strike legislation and legislation for the orderly settlement of industrial disputes. One group of countries primarily had in mind the protection of the public against the injurious effects of industrial warfare in the railway and other public utility service. Such reasons were evidently responsible for the legislative enactments in Canada, France, Italy, Russia, Roumania, Spain and Portugal, and the attitude toward employees of the railway administration of Austria and Germany. On the other hand, the preservation of industrial peace and the advancement in economic welfare of certain industrial classes had been primarily considered in framing the legislation of Australasian countries, and the prevention of industrial conflicts in the railway service was incidental to these broader purposes.

Among the Australasian countries, Mr. Chambers continued, the general tendency of legislation has been to place a limitation, and with practically one exception a prohibition upon the right to strike upon railway and practically all other classes of industrial workers. Another group of countries, on the other hand, such as Canada, the Transvaal, Spain and Portugal, have not denied absolutely the right to strike, but have made the exercise of this right contingent upon certain conditions—a notification to the government of the intention to strike or a governmental investigation and report. In the case of certain other European countries the right of utility employees to strike is absolutely prohibited, and no machinery is provided for ventilating grievances. Great Britain and the United States occupy the unique position of having no legislation abridging the right to strike. Both countries have provided official machinery for the adjustment of wage and other difficulties between the railroads and their operating forces. In the United States the mediation and arbitration of railway wage disputes is provided for by the so-called Newlands law. In the case of these two countries, Mr. Chambers asserted, where legal machinery has been provided for the settlement of grievances without any limitation upon the right to strike, the most pronounced success in dealing with disputes seems to have been attained.

Mr. Chambers said that in only one case had the efforts of the United States Board of Mediation and Conciliation to adjust a settlement by mediation failed and Congressional action been made necessary to deal with a situation for which there was no existing preventive remedy, *i.e.*, the threatened steam railroad strike this year. It remained to be seen, however, whether the attempt to settle an industrial dispute by special legislative action would prove as efficacious as mediation and voluntary adjustment. Mr. Chambers believed that the requirement of an investigation before a strike could be called, as in Canada, would be of real value only in offering further means for conciliation. In his opinion, the time has not yet arrived in this country when the principle of compulsory arbitration should be attempted by legislative enactment, and he was not convinced that the compulsory feature should be attached to any mediation movement, for the very idea of mediation depends on voluntary action.

CANADIAN AND AUSTRALASIAN PRACTICE

The next speaker was Victor S. Clark of the Carnegie Institution, Washington, D. C., who described the Canadian industrial disputes act. This act does not provide for compulsory arbitration; its purpose is limited to forbidding lockouts and strikes that directly affect the public welfare until their causes have been authoritatively investigated and made known to the people who will suffer through them. The jurisdiction of the law extends only to industries that serve immediately the general public. These embrace railways and transportation lines, yard and wharf labor, telegraphs and telephones, power, light and traction companies, and mines. Changes in the labor conditions of these industries must not be made without thirty days' notice. If either employers or workers object to a proposed change they may apply to the federal minister of labor for a board of investigation and conciliation, showing that a lockout or strike will occur unless the points at issue are settled. Thereupon the minister, after assuring himself of these facts, appoints a board consisting of three members, one of whom is nominated by the workers and the other by the employers. These two select the third member, or chairman, or if they fail to agree the minister of labor appoints him. No person having a direct or indirect money interest in the business affected is eligible to membership.

Wide latitude is given the boards in their method of conducting an investigation. They have the powers of a court to summon witnesses, to require the production of books and papers, and to take testimony under oath. They may personally inspect works and factories. If the parties cannot come to terms, the board reports its findings, which need not be unanimous. These contain a statement of the grounds of the dispute, an opinion as to the justice of the respective claims presented, and recommendations for a settlement.

Pending the investigation a lockout or strike is prohibited under penalties ranging from $100 to $1,000 a day for lockouts, $10 to $50 a day for striking, and $50 to $1,000 for inciting or aiding an unlawful lockout or strike. After a board has reported, employers may lock out their employees, or workers may strike, if they wish to do so. The only exception to this rule is when both parties have previously signed a formal agreement to abide by the decision of the board.

According to Mr. Clark, in the more than nine years of operation 212 disputes had been referred to boards and twenty-one strikes had occurred. Probably the number of employees involved in strikes that have occurred in Canada either in violation of the act, or legally because workers refused to accept the findings, is larger than the number involved in disputes successfully adjusted. No great strike, however, has occurred in this time. The enforcement of penal features of the law has generally been left to the aggrieved parties, but the provisions have acted as a deterrent. In Mr. Clark's opinion, legislation in this direction is demanded in the United States by the interest of all the people.

The subject of compulsory arbitration in Australasia was discussed by Matthew B. Hammond, professor Ohio State University, Columbus, Ohio. Professor Hammond said that all of the Australasian states try to use mediation and conciliation before proceeding to compulsory arbitration, and the former means are usually successful. In New Zealand, for example, from Jan. 1, 1909, to March 31, 1915, 466 disputes out of 694 were settled by conciliation, while 130 were substantially settled and only ninety-eight were referred *in toto* to the arbitration courts. In his opinion, the compulsory feature led many to settle their disputes by agreement.

In Professor Hammond's opinion, if compulsory arbitration is to succeed in keeping strikes at a minimum, it must set up conditions of employment, and the system tends to guarantee reasonably high wages and good working conditions. Drastic penalties to prevent strikes are not approved by the public, although moderate fines upon the workmen and heavier ones upon the labor leaders are favored. The best cure for strikes, however, is to provide conditions under which the men have no incentive to strike. Compulsory arbitration has greatly reduced the number of strikes, but from experience it is not a perfect preventive means.

In discussing the foregoing addresses, Peter J. Brady, secretary Allied Printing Trades Council, said that labor organizations in Canada and Colorado have voted for the repeal of compulsory investigation laws in these places. Labor is opposed to such laws because the investigation gives the employers time to prepare against strikes. In his opinion, there can be no law or interpretation of law by the courts that will compel men to keep at work under stated conditions of employment.

LABOR OBJECTIONS TO COMPULSORY ARBITRATION

At the evening session on Wednesday the first speaker was W. S. Carter, president Brotherhood of Locomotive Firemen and Enginemen, who stated the objections of organized labor to compulsory arbitration. Mr. Carter said that perhaps some objections were extreme and not founded on fact, but they were what workmen believed. Furthermore, they applied specifically to compulsory arbitration, and might or might not apply to the Canadian industrial disputes act and similar measures. The objections of organized labor were summarized by Mr. Carter in the following words:

> 1. It is but a scheme by which the employer hopes to gain a mastery over his employees:
>   (a) By making strikes illegal, and thus deprive working people of their only economic power.
>   (b) By suppressing labor organization, through depriving them of the power to effect their purpose.
>   (c) By creating conditions of labor through judicial process, which process the master class always has and always will greatly influence.
> 2. It is but the expression of a selfish desire of those who complain:
>   (a) To avoid the personal inconvenience incidental to all strikes, without regard to the injustice against which the workers are struggling.
>   (b) To avoid the financial loss to business interests engaged in production and transportation, regardless of the financial loss that may fall upon the workers.
> 3. It is but a symptom of the mental and moral degeneration, through which all great and prosperous nations have passed, when:
>   (a) Fundamental principles of individual liberty are forgotten.
>   (b) That for which the founders of liberty were honored becomes a social menace.
>   (c) The struggle for wealth overshadows all else, with consequent disregard for the rights of the working classes.
> 4. It is a deliberate effort to deprive working people of their economic power:
>   (a) Through guise of legislation to preserve public peace.
>   (b) Through an artificial public opinion, largely created by those who control the public press.
>   (c) Through a presumption that for public convenience the federal judiciary will find a method of depriving all working people of their constitutional rights against involuntary servitude except as punishment for crime.

In discussing Mr. Carter's remarks, Everett P. Wheeler, chairman committee on industrial arbitration, Reform Club, New York, N. Y., denied the existence of any master or servile class in this country. In his opinion there should be a tribunal to fix rates, on the one hand, and wages, hours, etc., on the other.

CONSTITUTIONALITY OF COMPULSORY ARBITRATION

Thomas I. Parkinson, Legislative Drafting Research Fund, Columbia University, in discussing the constitutional aspects of compulsory arbitration said that the courts have recognized the practical limitations upon the power to compel the performance of a contract for personal service. On the other hand, when the question of service to the public was involved, he did not consider that it would be violative of the involuntary servitude clause of the Thirteenth Amendment if a law should be passed undertaking to restrict by means of criminal penalties the right to strike. The right to quit work is not the same as the right to strike, and every restriction of personal liberty does not involve involuntary servitude. The public ought not to take away from employees the right to strike, however, unless a substitute should be given in the form of legislative standards for wages, hours and working conditions so that mediators and the public would be able to judge the relative merits of opposing claims. While a compulsory arbitration law would probably be constitutional, Mr. Parkinson made the observation that not all constitutional things are desirable.

ADVISABILITY OF ARBITRATION BOARDS

A written discussion from Emerson McMillin, chairman of board American Light & Traction Company, New York, N. Y., was presented at this session. Mr. McMillin believed that the statutory right of boards to investigate disputes promptly, either before or after strikes or lockouts, would tend to create a desire on the part of both parties to settle controversies. The only absolute essential is that the parties shall meet and discuss the question, and if the state must use compulsion it should first be used in the direction of requiring such meetings to be held before a strike or a lockout shall be inaugurated; or, in lieu of such meetings, it should be obligatory upon each of the parties to see that the state board is notified of the impending trouble and have time to investigate.

Mr. McMillin said that the Amalgamated Association of Street & Electric Railway Employees of America is required, by its constitution, to offer to arbitrate questions before a strike can be legally begun. Of course, it would be possible to make such an offer to arbitrate in a way that would assure its rejection. That strikes by local sections of this organization do take place sometimes without the offer of arbitration first being made would not be disputed, Mr. McMillin presumed. The representatives of this same organization were known to be opposed to compulsory arbitration, and that, too, while advocating that compulsory requirements so far as employers were concerned should be provided for in local franchises.

Mr. McMillin believed that for states to compel the employee and the employer to live up to the terms of an industrial agreement—for a definite time and until sixty days' notice of either party of a desire to terminate—could hardly be classed as involuntary servitude, the agreement being one that each party was competent to enter into and one that could not be construed against public policy. Should the courts not accept the principle of enforceable time contracts for industrial cases, it is still conceivable that it might be applied to railroad systems and public utilities. Mr. McMillin thought that all trade agreements should be for definite periods, and, in addition, should provide for a further continuation until the expiration of sixty or ninety days after notice of one or both parties that a termination was desired.

Mr. McMillin suggested that arbitration boards should contain five persons, including one from employees and one from employers. These two should be the active mediators and investigators. The other three, to be chosen from members of the bar, should arbitrate only such questions as would be certified up to them by the first two. Under the usual system, with two members practically committed to the views of their respective parties, Mr. McMillin thought that it was asking too much of each of the contending parties that the third man decide alone the momentous questions brought before him.

Some capable and active members of boards, Mr. McMillin said, are of the opinion that the present public desire is for the publicity of correct statistics, and that when this information is had, public sentiment will compel a reasonable solution. Agreeing that correct statistics should be given to the public, however, he did not think the information could, as a rule, be obtained in time to be of value in forming public opinion concerning the merits or demerits of an impending industrial disturbance. Nor did he believe that the public, during the period of such disturbances, would be more competent or more disposed to agree and amicably settle the question fairly than would the parties themselves. The great mass of the public would be guided largely by its sympathies and not by reason.

An address on "Arbitration of Street Railway Strikes" was scheduled for W. B. Fitzgerald, general organizer of the Amalgamated Association, but Mr. Fitzgerald was not present and no paper was submitted.

AIDS TO INDUSTRIAL PEACE

Three addresses were delivered at the opening meeting on Thursday upon various phases of work to secure industrial peace, as follows: "Federal Intervention in Labor Disputes Under Existing Laws," by David A. McCabe, professor Princeton University; "Mutual Aid Funds," by Miles M. Dawson, New York, N. Y., and "A League to Enforce Industrial Peace," by Judge J. H. Cohen, New York, N. Y.

Professor McCabe described the origin, passage and results of the Erdman and Newlands acts, and told how the threatened railroad strike this year found the country not fully prepared. The Adamson law, hastily passed, presents certain grave defects, in that Congress laid down terms without any inquiry into their merits and turned over a prejudiced case to a commission not possessing power to make recommendations which capital and labor can be called upon to accept and keep the peace.

Mr. Dawson described in general terms the mutual aid funds in this country which, although started on a narrow basis, have developed into real aids to industrial peace. In outlining the fundamental requirements of a sound aid fund, he laid particular emphasis upon the feature of joint contributions and management by employer and employees. He described a basis for computing the contribution of workers so as to carry the full measure of cost exclusive of the occupational hazard element. He did not consider that mutual aid funds would prevent strikes, but he believed that they would eliminate an inclination to strike for trivial reasons and that the mutual contact of employer and employees in administering such a fund would make for increased amity and respect.

The most elaborate and most constructive address of the session was that by Judge Cohen, whose remarks were listened to with special interest, because of his share in formulating the famous protocol that brought an unusually long period of peace to the unsettled garment-making trade in New York City. Judge Cohen stressed in particular the superior right of the public in labor disputes, and said that the law was ready for a better method of settling such disputes, but public opinion was lagging behind. He then proposed a definite league made up of all elements of society—the consumer, the neutral public, the worker and the employer (*i.e.*, the state itself)—founded upon the following propositions:

1. The clear recognition of the moral and legal right of men to organize.
2. The establishment of tribunals sanctioned by law.

whose membership shall be representative of all three parties (employees, employers and public).

3. The creation of fact-gathering machinery to enable such tribunals to determine what is in any given case a "fair and reasonable wage" and what are "fair and reasonable working conditions."
4. The clear recognition of the necessity for efficiency and discipline in all industrial organizations.
5. Opportunity to every worker to secure just redress from arbitrary or oppressive exercise of the employer's functions.
6. Opportunity to every employer to secure just redress from arbitrary or oppressive exercise of power by the men.
7. The right to appear by his chosen organization or spokesman before all sanctioned tribunals and in all dealings between employers and employees.
8. The registration of all collective agreements.
9. A national council, without whose sanction there shall be no concerted cessation of work or closing-down of plants, to which any interested party may apply for relief, as it may in public service matters to the Interstate Commerce Commission or the public service commissions, or, in trade matters, to the Federal Trade Commission.
10. Such national council to be constituted of members elected from groups of employers and groups of workers and representatives of the public.
11. In public utilities, clear recognition of the function of the state, as part of the regulation of the service and the rates, to determine what is a reasonable wage and what are reasonable working conditions.
12. Clear acceptance of the proposition that, adequate machinery being established for the redress of all just grievances, the right to coerce by concerted stoppage of work in all service affecting the public health, safety or convenience shall be made as obsolete as the duel or as illegal as lynching. (This principle to be applied if and when such machinery is established.)

In closing Judge Cohen said: "The basis of the great industrial compromise is here. The trade-unionist must yield in his opposition to governmental regulation of his organization; the employer must yield in his opposition to the organization of trade unions; the public must yield in its indifference to the conditions under which human work is done; the business man must yield in his opposition to 'social uplift' in industry, and the social reformer must yield in his indifference to efficiency and discipline in modern production. Upon such a compromise can be founded a program of preparedness for peace."

RATES SHOULD BE SUBORDINATE TO WAGES

At the last session, the annual dinner, Oscar S. Straus, chairman New York Public Service Commission, First District, said that the paramount question is how and to what extent should the power of the state be applied in order to compel the two industrial groups, operators and employees, to subordinate some of their group rights, just as the individual must subordinate some of his natural rights, to the general welfare. In order that public service monopolies may be at all times enabled to serve the public, the employees must also be made to recognize a duty to the public. They should not be permitted to appropriate the public necessities so as to compel public utilities, under threats, to concede their demands. In return, however, there should be accorded to and guaranteed to such employees exceptional wages and conditions of service. It has been suggested there should be in each state and in the nation a wage commission with power to regulate not only rates but also wages. In Commissioner Straus' opinion, the human element, wages and conditions of employment, should be paramount. Rates should be subordinate to wages and not wages, as now, subordinate to rates.

W. S. Carter, president of the Brotherhood of Locomotive Firemen and Enginemen, described the present wage system on steam railroads and gave two reasons for the refusal of arbitration by the men. These were, first, that arbitration had not been satisfactory in the past and, second, that the steam railroads had asked to have some of the smaller railroads excluded from the arbitration. In principle, arbitration was anomalous because the award had to be administered by one of the parties to the dispute.

Frank Trumbull, chairman executives' advisory committee and president Chesapeake & Ohio Railroad, the next speaker, pointed out that the railroads were limited as regards rates and hence could not do all they would like to do in the way of wages to their men. He reviewed the history of the negotiations last summer and the circumstances which led up to the passage of the Adamson law. He believed that the railroads owed a duty to shippers, passengers, their other employees, other employers and to the holders of railroad securities not to grant increase of such magnitude until the reasonableness of it had been recommended after investigation by an impartial board.

Bainbridge Colby, the last speaker, believed that the right to strike on public utility companies ought to be subject to limitation but defended the action of Congress and the President in passing the Adamson law under the circumstances that then existed.

Some Problems of the Industry*

There Are Too Many Supervising Bodies—Reforms Are Also Needed in Taxation

BY F. W. COEN

Vice-President and General Manager Lake Shore Electric Railway

ON the property which I represent we have to deal with seventy-five different political bodies, all of which feel it their duty in some measure to tell us what we should do and when to do it. The county commissioners or the county road supervisor will say that the track is too high or too low along some portion of the roadway, the township trustees will complain about some crossing, the councilman from the tenth precinct wants more service, a director of public service says that the paving needs repairing, the Mayor tries the trainmen for speeding, and likely as not the Council and the Mayor combined want a lower rate of fare with more liberal transfer privileges. Somebody will file a complaint with the commission that the company is not performing all of the duty which it should perform or that its employees are not treating the public properly, etc. Then the tax commission tells us what we should pay in the way of taxes toward the support of all the various parts of our government. With this I would have no quarrel if the same rule held good with the manufacturer, farmer, or all others by whom taxes are or should be paid.

For example, the public utilities, such as electric railways, electric lighting and others, are taxed generally on the basis of their net earnings; that is, gross income with the ordinary operating expenses deducted, and this sum capitalized on the basis of 10 per cent, represents the value of the property on which taxes should be paid. This method of valuing properties for taxation may be, and perhaps is all right, but if it is correct, why are not other industries taxed in the same manner? In a neighboring city there are three large and prosperous manufacturing industries whose net earnings for the past year amounted to approximately $36,000,000. If these concerns had been taxed on the same basis as our companies, they would have paid on a tax value of $360,000,000. But what is the fact? The tax value on these same companies was given to the public within the past week, and I find the tax value was fixed at about $37,500,000 or $1,500,000 in excess of their net income. In other words, the basis of taxation of The Lake Shore Electric Railway, if you please, is ten times greater than that of the manufacturing industries above referred to. This is only one instance of gross inequality; there are many others throughout the state and the entire country.

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*Abstract of a paper read at the convention of the Central Electric Railway Association, Toledo, Ohio, Nov. 24, 1916.

Then, in the matter of taxation, as you all know, we have the street paving, the sewer assessments, the sprinkling assessments, the street cleaning assessments, the general real estate tax, the personal property tax, the excise tax on gross earnings, the tax for the maintenance of the Public Utilities Commission, the federal income tax which has just recently been doubled, in some cases a franchise tax, in other cases a tax on gross receipts payable in some instances to the city, as well as numerous others. All of these items tend only in one way, and that is in the increase of operating expenses, without anything in return. It has always been my belief, and is now, that a number of these tax charges should not be made against the utility and that whatever benefit, if any, is derived therefrom, should be given to the utility if it needs it properly to maintain its property and return a proper income on investment and to a proper remuneration to its employees; and if there is anything then remaining, it should go to the benefit of the general riding public.

There is another thought which comes to my mind. The automobile industry has made wonderful strides during the past few years. We find the jitney, the auto truck, the auto bus operating between various communities, and the automobile used for almost all purposes. These conditions have made wonderful changes in the transportation industry and no doubt many changes will come in the near future. But I should like to have someone give me a good reason why the jitney, the auto truck and the auto bus should not be declared public carriers? Jitneys should be required to get a certificate of public necessity and the auto bus should have a license, and its rates and regulations should be prescribed the same as for any other public utility. Finally some action of the legislature compelling automobile drivers to stop before crossing any railway track is absolutely necessary to prevent enormous loss of life.

There is an old saying, that "man can serve but one master." In our predicament we have many masters, and it is my firm opinion—and when I say this I am expressing my opinion only—that there should be one central authority covering as many of these questions as is possible. For example, the matter of operation of our property should rest in one authority. The matter of granting franchises should rest in that same authority. The matter of the type of construction of our properties and the service given by them, should likewise rest in this same authority. The charges which we should be permitted to make should be subject to review and revision by the same authority to determine if the rates and charges are fair, just and equitable, as between all parties interested. In other words, I believe that in this state the Utilities Commission, if you please, should have authority on a showing of necessity, to grant this company or any other company, a franchise to operate a railway and that such permission should be without limit as to time so long as such utility gives reasonable service at reasonable rates and performs the function delegated to it to be performed. This same commission should have authority, if necessary, to require additional service or reduce the service as changing conditions require. It should have authority to order, if necessary, additional equipment, the rebuilding of tracks, the installation of additional power, or in fact anything going into the operation and maintenance of the utility. The commission should likewise have authority to protect the utility in the matter of earnings and of unnecessary requirements of extensions or street improvements, and it should be in position to guarantee beyond question to an investor, that a reasonable return could and would always be earned, barring, of course, calamities such as no one can foresee. Even in case of a calamity, a company should be allowed to earn sufficient to take care of such a contingency. This commission should be composed of men eminently fitted for the work, men in whose judgment every one would have confidence, and their compensation should be such as would properly pay them for their service.

Furthermore, I do not believe that earnings should be limited to any such rate of interest as 6 per cent on investment. The business of the electric railway has in days gone by changed so rapidly that the risk is too great for any such return. Furthermore I believe it would be advantageous to everybody concerned, if there was a premium on economy and efficiency in the operation of the property.

I hope that each and all of you will become, if you are not already, personally acquainted with every member of the legislature in your territory, so that you can go to him and explain in detail if necessary, why this bill or that bill will be a benefit or a detriment to the property which you represent. I believe that a great many bills become law simply because the whole truth about them is not known to the lawmakers. Give them the real facts and all of the facts, place yourself in such a position that you can go to your representatives and discuss with them freely any matters in which you are interested, to the end that they may have full and complete information before they are asked to pass upon important questions. If you will do this you will have done much for your property and the community.

Safety Work in Electric Railway Operation*

Results in Columbus, Ohio, Have Justified the Efforts Expended During the Past Two Years

BY HAROLD W. CLAPP
General Superintendent The Columbus Railway, Power & Light Company, Columbus, Ohio.

AT the present time man lives with scarcely a thought of the necessity of giving attention to his personal safety. The general trend of a curve representing the amount of man's thought for personal safety has been downward until it almost reached the zero point. This was about the time when the influence of such organizations as the National Safety Council began to be manifested. A better sentiment had already began to take form in the systematic and persistent organized safety work undertaken by the Chicago & Northwestern Railroad and other corporations. It was gradually augmented from time to time by the entrance of industrial companies into the field until the formation of the National Safety Council in September, 1913.

The scope of safety work includes every phase of life, every avenue of human endeavor. It is good for us at play-time and in our home life. It embraces the fields of fire prevention, sanitation and conservation of health, as well as the prevention of accidents of all kinds, at all places, at all times.

In our own organization at Columbus at about the close of the year 1914 we began to realize that the amount of money being expended for lost time and physicians' fees in connection with employee accidents, and for damages in public accidents was excessive. We decided that organized safety work would afford us relief, and launched our movement on Jan. 4, 1915. Our first year's work produced a reduction in employee accidents of 10.2 per cent. We are receiving the hearty co-operation of our employees and are still making progress.

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*Abstract of a paper read at the convention of the Central Electric Railway Association, Toledo, Ohio, Nov. 23, 1916.

The plan of the public side has been very simple. I shall outline briefly what we are doing.

First, we are maintaining equipment in good operating condition and are requiring our men to live up strictly to the rules. We post weekly on special bulletin boards attractive literature dealing with the subject. In order to keep up interest in August, 1915, we commenced a special contest between car houses to reduce collisions between cars and vehicles. No reward was offered for good work; we relied upon the competitive spirit of the men to bring results. On July 1, 1916, however, we began a second contest and set aside the sum of $1,000 to be divided among the men of the two car houses making the best showing as compared with the record of a year previous. We announce the scores made each month by means of specially prepared cartoon bulletins. This contest has awakened much interest and has reduced these accidents.

We have acquainted the public each month with the results accomplished through a series of car window posters giving only the records of collisions between cars and automobiles, and between cars and wagons, and accidents in boarding and leaving moving cars. These posters have been the means of securing much co-operation from car riders.

In common with other cities we have been experiencing an increase in the number of collisions between cars and automobiles, but our increase is smaller than that in the majority of cities of our size and traffic conditions. In this connection we mailed last week 11,000 circular letters to all automobile owners in Franklin County explaining the principal ways in which accidents occur between cars and automobiles, and requesting co-operation. The result has been very satisfactory.

Our company has now been engaged in organized safety work for nearly two years. A statement concerning the four classes of accidents above referred to will indicate whether or not the work has been worth while. The average number of boarding-moving-car accidents for the first ten months of 1914 was 8.5 per 1,000,000 passengers as compared with 7.2 for the same period of 1916, a decrease of 15.3 per cent. The average number of leaving-moving-car accidents for ten months of 1914 was 12.1 per 1,000,000, while for ten months of 1916 it was 4.06, a decrease of 66.4 per cent. The average number of collisions between cars and wagons for ten months of 1914 was 64 per 1,000,000 car-miles, and for 1916 it was 38.8, a decrease of 39.4 per cent. In collisions between cars and automobiles we had 51 per 1,000,000 car-miles for ten months of 1914 as against 67.4 for this year, an increase of 32.1 per cent, but even this 32 per cent is a good showing, when it is considered that there are 83 per cent more machines on the streets than there were two years ago. In addition this year has seen three times as many new men employed in the transportation department in the first nine months as during the entire year 1915, due to peculiar labor conditions.

There are two undeniable reasons why safety work should be undertaken; first, the humanitarian reason, and, second, the sociological. Safety work has proved that accidents can be very largely eliminated. At one time in our railroad history we were inclined to think that schedules and speed should be maintained and humanity allowed to take care of itself, but now it is different. The public conscience will not stand for it, and that very same public conscience has been influenced in very large measure by the humanitarian spirit of the men back of our corporations, which were once considered heartless.

Along with the humanitarian phase of safety work is the efficiency and financial phase. Such work teaches cleanliness, alertnes sand thoughtfulness, and these make for efficiency and economy in all branches of industry, whether private or public. The influence which this work has in causing the platform men to study operation more closely makes a very appreciable showing in maintenance costs. In addition, I might add that our claim department settlements during the first year of safety work were reduced 45 per cent.

On the sociological side it may be said that the pauperizing of individuals and families resulting from the annual loss of life and reduction of effectiveness together with the attendant loss of opportunity for education and physical and mental development, has had a close relationship to crime. Hand in hand with safety work, however, have gone employees' welfare work; the establishment of works hospitals, community centers and playgrounds; the enforcement of sanitary regulations, etc., the whole tendency being to influence employees so that there will be a smaller number of accidents. The cost of all of this has been very much less than the cost of accidents. The entire plan has had the effect of bringing employees and management closer together.

In conclusion we may raise the question, Will safety work pay, does it pay? I reply that it does pay and in two ways: First, in the satisfaction of so operating a property that there shall be at the end of the year a shorter list of maimed and killed, and this is the greatest part of the pay; second, in the less number of dollars that have to be paid out each year as a partial recompense for losses that can never be adequately offset, even with cash.

Railroad Investment Must Be Attractive

Speaking before the Boston (Mass.) City Club on Nov. 13, Ivy L. Lee, formerly assistant to the president of the Pennsylvania Railroad, stated that the steam railroads are now doing all the business they can possibly handle, but the facilities are woefully inadequate and the disparity between facilities available and traffic presented is becoming greater every day. In his opinion the attitude investors have taken is very clearly to be gathered from the fact that during 1916 not $1 of new railroad stock has been listed on the New York Stock Exchange to provide money for new railroad building.

Mr. Lee believes that the solution of the present railroad problem lies in developing without any delay a system of railroad regulation which shall not be controlled by political animus or prejudice, and which will frankly recognize this fundamental fact. If the country is to obtain the railroad facilities absolutely necessary to move the national trade, it must be willing to pay the bill. That means that it must permit railroads to earn sufficient profits to attract the necessary private capital. Otherwise private capital will put its money elsewhere, and government ownership, with all its inevitable blight upon the national life, with all its red tape, waste and cost to the people, will be the only recourse.

Truss-Side Construction for Railway Cars*

The Author Outlines the Reasons for the Development of Truss-Side Designs for Steel Cars and Discusses the Action of Car Framing in Severe Collisions, Reaching the Conclusion That Increased Strength of Superstructure Is Essential

By L. B. STILLWELL
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STATISTICALLY considered, a car is simply a covered bridge supported near its ends. Designers have developed three types: (*a*) That in which the load, including the sides, ends and top of the car, is supported by the underframe. (*b*) The type in which the load is supported by the underframe assisted by a light plate girder on each side of the car, the depth of which is equal to the distance from the upper edge of the belt rail to the lower face of the sills. (*c*) The high side frame, or truss construction, in which the load is carried on the sides of the car constructed as truss girders.

It appears obvious that, if an engineer were called upon to design a covered bridge equal in length to a 70-ft. car, he would use the side-truss construction, and the question arises as to why has this type not been adopted generally. The difficulties in the way are those incident to designing the truss girders that constitute the sides so as to leave proper spaces for the windows. These difficulties call for careful proportioning of the members, but are by no means insuperable. In fact, the problem has been solved satisfactorily, as is evidenced by several hundreds of cars now in use, of which many have been subjected to exceptionally severe service for a number of years. An answer to the question, therefore, is to be sought in the history of the evolution of the steel passenger car, and this at once gives the key.

For many years cars were made of wood, a material the characteristics of which are such that it is not practicable to construct the sides of cars as trusses, with appropriate spaces for windows, owing to the practical impossibility of securing necessary strength in tension and compression at the joints between the members. Consequently, wooden cars have been so designed that the underframe, reinforced by steel truss rods as tension members, carries the load, including the superstructure.

The next stop in the evolution of the modern passenger car was the complete substitution of steel for wood in the underframe, the superstructure still being constructed of wood. The depth of the sills being limited by considerations of necessary clearance, the distance between points of support of the center sill made it necessary to employ a comparatively large section, which, of course, involved great weight.

The third step was the substitution of a steel superstructure for its wooden predecessor. In a great majority of cases this has been done without modification of the structural scheme of the car framing.

The first steel car for electric railways in the United States, if we are informed correctly, was built for the subway in New York, and in this instance the steel underframe was assisted in carrying the load by a girder on each side of the car. The upper member of this girder was the belt rail, the lower member the side sill, while a ⅛-in. web, riveted to the upper and lower members, completed the girder construction. The side sills constituted the tension members of the plate girders, and the latter carried the load, the center sills being comparatively shallow. This design has not been adopted extensively by steam railroads, although it is largely used in electric railway service.

The next step (and from a structural standpoint it would seem to be necessarily the final step) in the evolution of a steel passenger car of maximum strength and minimum weight was the development of the high side frame, or truss, construction, in which the entire height of the side frame of the car, from side sill to roof, was developed as a supporting girder. It is obvious that, when the members comprising the entire side of the car are fully developed as a truss, the load is supported by a framework some 7 ft. in height, as compared with a girder about 3 ft. in height when the members below the window line of the car form the girder, and as compared with the insignificant depth of the underframe when this alone is utilized to support the weight. The high side frame employs a side plate at the top and a side sill at the bottom. These are about equal in section and are connected by side posts specially designed to resist bending, and thoroughly braced and stiffened by the side sheets and the so-called "letter board." This structure is stiffened against horizontal deflection at the top by the deck, which may be considered aptly as a horizontal flange for the high side girder. Such a design produces a car wall of exceptional stiffness which is practically as strong at the roof as at the floor.

The high side frame, or truss system possesses not only great carrying power, as compared with the contrasted types of car framing, but its natural and logical development is a co-ordinated car structure characterized not only by great load-sustaining power, but also by exceptional capacity to resist collision impact. Moreover, this distribution of material, which takes metal from the underframe and utilizes a part of it in strengthening the sides and roof of the car not only secures a car of great stiffness and load-carrying capacity, but also tends to prevent collapse of the superstructure in case of derailment.

In severe collisions the side walls sometimes are torn from the underframe, and at other times are spread apart at the roof line. These failures obviously point to the desirability of a strong side frame and an end frame which will secure the side walls from spreading either at top or at bottom. They also point to the necessity of a thorough development of all joints of the structure.

In that type of side-frame construction which employs the members of the side walls below the window-sill line to carry the principal load, the side posts and side plate at the roof line are usually very light and, consequently, incapable of withstanding any great stress if the collision impact is applied above the window-sill line. The high side frame, however, affords a far better opportunity to minimize the effects of such stress, for the reason, as has been shown, that the side walls are of great stiffness and practically as strong at the roof as at the floor.

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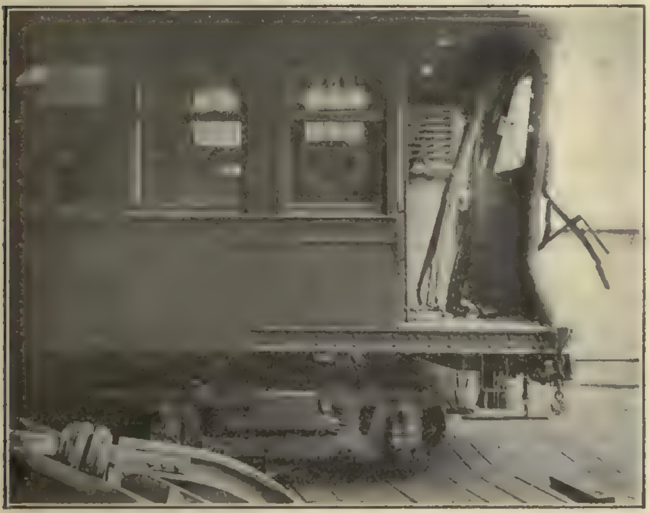
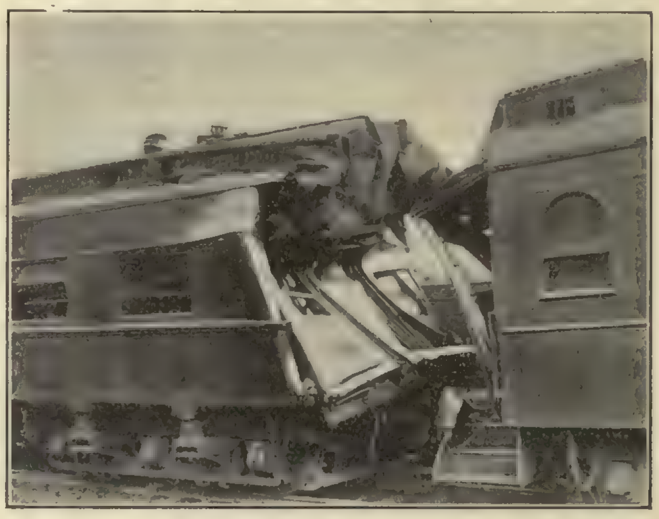
*Abstract of a paper presented before the Central Electric Railway Association at its Toledo, Ohio, meeting, Nov. 23-24, 1916.

Generally speaking, in the case of violent collision observation shows that the underframe of one car is raised by the shock of impact sufficiently to clear the underframe of an adjacent car, and that in this position the latter, as we say, is telescoped. Before one car can enter the other, however, the body end-posts of the latter must be torn from their fastenings, and, as usually constructed, these members offer but little resistance. The high side-frame construction, however, provides in itself a comparatively very stiff structure at the roof line.

It may be pointed out here that the vestibule construction now in such general use can be utilized to good effect to cushion the shock of collision, as considerable energy is absorbed in the distortion or destruction of the vestibule. It is obvious that, if the car body proper has a side frame capable of resisting the shock at the roof line as well as in the under body, the effect of the collision will be concentrated—if the term may be used—upon the vestibule. This function of the vestibule as a buffer in case of collision has frequently been pointed out.



TRUSS-SIDE CARS—EFFECT OF COLLISION ON CAR WITH TRUSS-SIDE FRAMING



TRUSS-SIDE CARS—EFFECT OF COLLISION ON CAR WITH LIGHT SUPERSTRUCTURE

An examination of photographs of train wrecks and a study of many wrecked cars apparently justifies the following conclusions: 1. It is seldom that any serious damage is caused by the failure of the underframe. 2. In cases of collision the most serious damage usually results from the underframe of one car over-riding that of a neighboring car and destroying the superstructure of the latter by separating the side walls a distance sufficient to permit the entrance of the penetrating car body. 3. Failure of a structure occurs through a disruption of joints; members are seldom completely fractured between joints, the riveting usually proving inadequate to develop the full strength of the associated members. 4. Vestibules cushion the shock of collision with good effect, a large amount of energy being absorbed in the crushing of the vestibule members before penetration of the car body occurs.

To minimize loss of life and injuries to passengers in case of collision, the strength of the superstructure should be increased, if possible, and particularly in respect of its ability to resist telescoping or crushing, by end shock. Also the great weight and strength of the underframe are factors which contribute materially toward increasing the damage when one car over-rides another. Obviously, devices for preventing the over-riding of cars, by maintaining the underframes in line, are of great value in so far as they can be made effective, but it is very difficult, if not impracticable, to construct such devices so as to prevent over-riding in case of violent collision or derailment, when the underframe of a car is frequently forced against the superstructure of another.

As regards depreciation of steel cars in normal service, about the only conclusion which can be deduced with certainty from examination of wreck photographs is the fact that, as usually constructed, the riveting of associated members does not fully develop the strength of those members; in other words, that the line of rivets is the line of weakness. It requires no argument, however, to prove that the life of an all-steel passenger car is practically the same as that of its weakest essential joints. If riveting is inadequate, either because the number and size of rivets are insufficient or because the holes punched in two connected plates are not accurately aligned before riveting, the strains to which the superstructure is subjected, even in normal service and assuming no accidents, may be expected to result in a more or less serious movement of one member with reference to the other. Unless great vigilance is exercised in keeping all joints painted, this movement will result in more or less corrosion of plates and rivets. Here, again, it seems obvious that the high side-frame construction possesses marked advantages over either of the contrasted types of framing, and particularly over that type in which the underframe supports the entire load.

When a car passes around a curve, the outer rail of which is elevated, the outer side bearing on the front truck tends to lift the car body, the lifting force being exerted vertically at a distance of approximately 2 ft. 6 in. from the center line of the car, and if the superstructure is lightly constructed it may be subjected to excessive torsional or twisting strains. So far as the effect of this lifting effort is concerned the center sill, no matter how heavy, cannot prevent the strains upon the superstructure. Under similar circumstances the high side-frame construction, which makes of the superstructure a strong steel box with heavy end walls, is affected far less seriously, since every element of the superstructure can be so constructed as to oppose to the strains incident to the superelevation of the outer rail ample resisting strength.

Consideration of car design involves, naturally, the subject of truck construction and brake equipment. In 1911 we were called upon to design a special truck for steel cars 72 ft. in overall length. As it was, of course, desirable that the total weight of the car should be kept down, special attention was given to the framing of the truck to minimize its weight while retaining all possible elements of strength and to secure an easy-riding vehicle. The truck was designed and built without equalizer bars, helical springs being placed directly between the journal boxes and the truck frame. The side frame of the truck was built up of rolled members, and was of the deep side-truss, or arched bar, type of construction. The transoms were especially deep and well connected to the side frames of the truck. Extra long elliptic springs were permitted by this deep side-frame construction. In use this truck has proved very satisfactory. It is light, easy running, and its riding qualities are exceptionally good. Favorable comment by the patrons of the road, who noted particularly the easy riding qualities of the equipment, has led to the adoption by this line of the name "The Road of Ease."

Comfort of passengers is not the only consideration through which a road benefits by easy-riding rolling stock. Unquestionably the minimizing of vibration affects favorably the maintenance of rolling stock, and the power required to move an easy-running car is less than that required by a hard-riding car. Moreover, the effect upon track and roadbed is in the direction of decreased maintenance.

It may be said that the motor trucks of these cars were provided with clasp brakes—the first to be applied in electric railway service—because the weight of the cars was such that very high brake-shoe pressures had to be used. Experience extending over several years has demonstrated that the brake shoe wear is 15 per cent less on the motor trucks fitted with clasp brakes than on the trailer trucks of the same car which are fitted with single brakes, due allowance being made for the work of retardation effected by the two trucks. This is due to the lower temperature and consequent higher coefficient of friction in the case of the clasp brake equipment. It has been found, also, that the reliability in service of trucks fitted with clasp brakes is materially increased, owing to the fact that journals run cooler and the bearing surface of the journal is not disturbed in its position under the brass by an unbalanced brake-shoe pressure such as occurs when the single brake shoe is used. However, the improper application of two brake shoes per wheel may easily produce conditions worse than those which now occur with a well hung, single brake shoe.

COMMUNICATIONS

Finding the Defect in Car Axles

Union Traction Company of Indiana
Anderson, Ind., Nov. 15, 1916.

To the Editors:

You might be interested to know that since your publication of my article on "Finding Defects in Car Axles" we have found a defective car axle of large dimensions—one of our very large type with a diameter of 7 17/32 in. at the gear seats. The axle was cracked about half-way around. This no doubt would have proved to be a very serious matter if we had not been able to find it through the process which I described, as the flaw was not visible to the eye after the gear was pushed off. In this case it was necessary to remove the gear to renew it, and our standing order is that when a gear is removed, both wheels must also be removed and the axle tested.

Needless to say, I am extremely thankful that this defect was found as it was under one of our heavy interurban cars which operates at high speed.

R. N. Hemming,
Superintendent of Motive Power.

Demand for the One-Man or "Light Safety" Car

St. Louis Car Company
St. Louis, Mo., Nov. 20, 1916.

To the Editors:

Apropos of the several suggested names for the type of small rolling-stock units known as one-man cars, we have been urging the use of the name "light safety" cars. That name would assist in their introduction, and it certainly signifies the aims of their designers and users. In agitating the use of these cars and setting before the industry the benefits to accrue from their use, the Electric Railway Journal is doing a work that will redound to the benefit of railways and manufacturers alike. We are trying to do our part by building "light safety" cars in advance for stock.

We have recently contracted with the city of Monroe, La., for three "light safety" cars, with all safety control features for double-end operation; with the Wichita Falls (Tex.) Traction Company for five cars with all safety control features for single-end operation, and have received a duplicate order from the Aberdeen (S. D.) Street Railway Company for "light safety" cars.

The future of the "light safety" car seems assured. Reports coming from Fort Worth are so glowing that we can discount them and still claim that the "light safety" type is the best proposition for economy. We have in our files hundreds of letters showing an intense interest in this class of equipment and are actually figuring with some twenty-five roads for orders. It would appear that the further one goes into this question the more he becomes convinced of its merit. So strongly imbued are we with its future that, as mentioned above, we are building some for stock. I estimate that within the first six months of next year at least 300 of these equipments will be ordered, and in making this estimate feel that I am conservative.

Nic Le Grand.

First Multiple-Unit Electric Locomotives?

New York, Nov. 21, 1916.

To the Editors:

There is a statement in the paper by Frank J. Sprague, appearing in your issue of Oct. 14, 1916, which I should like to see elucidated. On page 774 it is stated that the original New York Central locomotives "were the first to be equipped with the multiple-unit control so that two or more could be operated together." To the best of my recollection, the first of these locomotives was completed in October, 1904, and put into experimental operation on the experimental track at Schenectady. It was announced in the technical papers that the order for these locomotives had been placed in November, 1903.

About August, 1903, the B. & O. Railroad received (from the same builders) four eight-wheeled units, each unit or half locomotive weighing 80 tons, built for slow heavy-freight service on the Belt Line. These locomotives were designated as General Electric Type L.R. 654 and came equipped with the type M control, Form C, and from the start were operated two together, by the Sprague-General Electric multiple-unit control system. They are still in service, and are operated three units together, because of the much heavier trains being hauled nowadays. I am quite positive about that control, I saw the locomotives the day they arrived and rode on them many times subsequently. Mr. Sprague states that the New York Central locomotives were the first to be so equipped. Was their apparatus manufactured a year or so before the order for the locomotives was placed? Or did Mr. Sprague overlook the B. & O. locomotives in preparing his paper? If so, does not this make them the first ones so equipped? I ask the question as a matter of historical interest.

H. J. KENNEDY, M.E.,
Electrical Engineer and Engineer of Construction.

[NOTE. The above letter was brought to Mr. Sprague's attention and he stated that he was pleased to have the circumstances surrounding the early application of the multiple-unit system to heavy traction set forth in this way. He was not directly in touch with the B. & O. installation and was not aware of the exact date of the delivery of locomotives to this railroad.—EDS.]

Improvements in the Work of the Engineering Association

PITTSBURGH, PA., Nov. 23, 1916.

To the Editors:

We are grateful for the steps taken by the ELECTRIC RAILWAY JOURNAL to arouse keener interest in association affairs. It may interest you to know that the executive committee of the Engineering Association, realizing the weaknesses pointed out in the editorials appearing in your issue for Nov. 18, have adopted a new plan which we hope will be productive of much improvement in the work lying before us. Arrangements have been made whereby the starting of committee work is made possible immediately at the close of the convention. This coming year the committee on subjects will have concluded its investigation and report prior to the convention. The incoming president will have in his hands sufficient information concerning the qualifications of candidates for committee membership that it will be possible for him on the closing day of the convention to announce the full committee organizations and the subjects which the committees are to study.

There are other needed reforms which we believe will be put into effect in the very near future, particularly with regard to the Convention Proceedings. There is a surfeit of detailed material in committee reports which is essential for committees to consider but which need not be dwelt upon in the Proceedings. We might profitably dispense with the reading and discussion of much of the extraneous matter, which has heretofore been presented to the convention, utilizing the time assigned to the meetings to the discussion of the broader aspects of the several subjects. This should tend to stimulate greater interest in the meetings.

Referring to the association and its mission I believe that the electric railway engineer bears a responsibility not only to the company by which he is employed but also to the industry as a whole. This is true because whatever progress is made in the art of transportation, and whatever developments the future may bring forth, must come only as a result of the activities of the engineer. Without a medium of exchange of thought, and organized concerted effort to produce the desired results, much time and money are bound to be lost. In this regard the electric railway engineer finds right at hand an association designed and organized for the very purposes which conduce to economy and stimulate progress in the art. It is therefore the duty of every electric railway engineer to become an enthusiastic, active member of this association.

F. R. PHILLIPS,
Superintendent of Equipment Pittsburgh Railways,
President American Electric Railway Engineering Association.

AMERICAN ASSOCIATION NEWS

T. & T. Committee Appointments

Secretary Burritt has announced the following committee appointments. Lists of other association committees will be printed in later issues as completed.

Construction of schedules and time-tables—Edward Dana, Boston, Mass., chairman; R. T. Sullivan, Youngstown, Ohio, vice-chairman; C. F. Flocker, New Orleans, La.; Howard F. Fritch, Boston, Mass.; Alexander Jackson, Newark, N. J.; J. A. Stoll, Baltimore, Md.

Fares and transfers—C. S. Ching, Boston, Mass., chairman; E. E. Strong, Rochester, N. Y., vice-chairman; G. S. Brush, Portland, Me.; Charles Currie, Akron, Ohio; W. C. Harrington, Kansas City, Mo.; J. T. Moffett, Washington, D. C.

Passenger traffic—Chairman (appointment to be announced); E. M. Walker, Dubuque, Iowa, vice-chairman; C. R. Gowen, Syracuse, N. Y.; I. H. Pound, Benton Harbor, Mich.; R. M. Sparks, Boston, Mass.; C. F. W. Wetterer, Boston, Mass.

Rules—J. E. Duffy, Syracuse, N. Y., chairman; F. H. Hill, Elmira, N. Y., vice-chairman; H. L. Beach, Salt Lake City, Utah; A. Benham, Springfield, Ohio; Harold W. Clapp, Columbus, Ohio; S. W. Greenland, Fort Wayne, Ind.; W. M. Kessler, Tippecanoe City, Ohio.

Subjects—H. C. Donecker, Newark, N. J., chairman; F. W. Coen, Cleveland, Ohio; James E. Gibson, Kansas City, Mo.; R. P. Stevens, Youngstown, Ohio.

Training of transportation employees—Chairman (to be announced); C. W. Kellogg, Keokuk, Iowa, vice-chairman; W. A. Carson, Evansville, Ind.; L. H. Conklin, Scranton, Pa.; H. B. Flower, Baltimore, Md.

JOINT COMMITTEES

Block signals for electric railways—Transportation & Traffic—J. W. Brown, Newark, N. J., vice-chairman; J. J. Brennan, Fort Wayne, Ind.; J. J. Doyle, Baltimore, Md.; G. K. Jeffries, Indianapolis, Ind.; (Engineering Association members not yet announced.)

Claims-Transportation—Transportation & Traffic—H. A. Bullock, Brooklyn, N. Y., chairman; A. Gaboury, Montreal, Que.; E. E. Soules, Peoria, Ill.; (Claims Association members not yet appointed).

Transportation-Accounting—Transportation & Traffic—A. E. Reynolds, Glens Falls, N. Y., chairman; N. H. Brown, Buffalo, N. Y.; J. H. Van Brunt, St. Joseph, Mo.; (Accounting Association members not yet appointed).

Transportation - Engineering — Transportation & Traffic.—G. H. Clifford, Fort Worth, Texas, co-chairman; F. W. Coen, Cleveland, Ohio; F. W. Hild, Denver, Col.; (Engineering Association members not yet announced).

Some Recent Advances in

EQUIPMENT AND ITS MAINTENANCE

United Traction Company, Albany, N. Y., Finds Air Tamper Useful for Breaking Concrete, Cleaning Rusty Steel, Drilling, Pocketing Brick, Etc., as Well as Tamping—Virginia Railway & Power Company Finds Automatic Stop Entirely Practicable—Lehigh Traction Reclaims Worn Motor-Axle Bearings—English Railway Official Discusses Gear Case Maintenance as Practised in Great Britain

(Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.)

Reclaiming Motor-Axle Bearings

Babbitting Jig Effects a Saving of $80 Per Car on an Interurban Road

BY JAMES W. BROWN
Superintendent of Shops Wilkes-Barre & Hazleton Railway and Lehigh Traction Company, Hazleton, Pa.

Remarkable economies have been obtained on the Wilkes-Barre & Hazleton Railway and the Lehigh Traction Company by the use of babbitting jigs in reclaiming motor-axle bearings. One of the many jigs used in the shops of this company is that for a GE-69-C motor-axle bearing shown in the illustration herewith. The bearing can be re-lined or re-babbitted by means of this jig, which was designed to hold either half of the bearing.

The bearing is first placed in a special split chuck, which was described in the ELECTRIC RAILWAY JOURNAL of May 13, page 913, and bored out 9/64 in. larger than the diameter of the axle. The collar of the bearing is faced off to 7/16 in. thickness, and the bearing is then taken out and each half of the old collar is drilled for riveting a new brass collar on to its face. This new brass collar is cast in a solid ring, faced on one side and then drilled to take ⅜-in. diameter copper rivets, which are made from scrap copper wire. The new brass collar is then sawed in two and riveted to each half of the old motor-axle collar. The bearing is then placed in the jig and the outside brass collars faced to the original diameter. After the collars are faced to the proper distance between the hubs, the bearings are taken to the babbitting room, tinned and placed in the jig (shown at the left of the illustration) and babbitted.

JIG FOR RECLAIMING MOTOR-AXLE BEARINGS

This device eliminates clamps and bolts, and no clay is necessary to hold the bearing while it is being set up in the foundry. A small riser is cast on the end of the bearing which permits the gas to escape from the top and insures a clean bearing free from blowholes. The fins are trimmed off the bearing and it is then placed in a boring jig in the lathe and bored out 0.0014 in. larger than the axle. There are four ⅝-in. dowel pin holes drilled in each motor-axle bearing, hence there are no rights or lefts. Again, in re-babbitting these bearings, the good dowel pin holes are utilized. The bearing is, therefore, placed on the opposite side from which it was used before being re-babbitted.

The total cost of the bearing, including the labor, the brass collars and the babbitt metal, is approximately $5. These bearings have made from 50,000 to 75,000 miles on the Wilkes-Barre & Hazleton cars, which weigh 90,000 lb. and are operated at 40 m.p.h. on grades up to 3 per cent. The original cost of these bearings averages $15 each, and as scrap babbitt metal was used, the results show a net saving of about $80 per car.

Gear Case Maintenance Experience

Troubles Due to Design of Gear Cases and Conditions of Track and Roadbed

BY "VULCAN"
A.M.I.C.E., A.M.I.E.E., England

The amount of trouble attributable to motor gear cases varies considerably on different electric railways. For instance, on one system well known to the author there are over 300 electric cars, and the number of gear cases purchased per annum has not exceeded half a dozen, whereas on another system of about the same size the number purchased and used during the year was over thirty times as large, and in addition to this a great many gear cases were repaired for further service.

The latter is probably an extreme case, but was fully accounted for by the extremely bad condition of the track, which set up excessive vibration and subjected the different parts of the equipment to unusually severe shocks and jolts. The conditions, however, were favorable to comparing the different methods of construction embodied in the various types of surface car gear cases. These different types of construction are described in this article, and the result of the author's experience in the use of gear cases under widely different conditions is given.

The gear case of an electric railway motor must of necessity be rigidly supported and overhung from the end of the motor. The brackets or lugs which carry it and also the parts of the gear case to which the latter are attached are therefore subjected to severe shocks and stresses when the car is continually jolting over bad rail joints and special work. The severity of these conditions is the determining factor in the life of the gear cases, and if the track conditions are abnormally bad great care must necessarily be used in selecting a suitable type.

Probably the most common type of gear case has its two halves made of malleable iron, the lugs forming part of the upper half casting. The ribs or webs connecting the feet to the side spread the stresses over a considerable area of the main casting and form strong supports. This class of gear case has undoubtedly given general satisfaction, and the only objection urged against it is its weight, which is somewhat excessive as compared with other types now to be obtained.

The first attempts of any importance made to reduce the weight of gear cases consisted in making them of sheet steel in many sections, joined together by rivets. These were very soon found to be unsatisfactory, for even on good track the riveted joints, particularly those between the feet and case, shook loose and were generally troublesome and noisy. A more substantial job was made by the electrical spot-welding process. The spot welds between each rivet had a stiffening effect, and thus considerably increased the life of the gear case.

Another method which has been employed for joining the parts of sheet steel gear cases together is the oxy-acetylene process, which has the advantage of low first cost. These cases have been experimentally tried on many systems and have given a certain amount of satisfaction under the favorable conditions of good permanent way, but the trial records show that they are not capable of successfully withstanding the excessive vibration and shocks which bad track produces. Under the latter conditions the life of oxy-acetylene welded gear cases is generally a short one, the joints being as a rule the first parts to give way. The trouble seems to be due to the difficulty in getting a metal to form the joints and fillets, which after being applied by the oxy-acetylene blowpipe will still retain its original ductility. A considerable improvement was effected by the introduction of the pressed steel type of gear case, the top and bottom halves being pressed from a single sheet of steel.

With the object of producing a gear case of light weight many designs employing different kinds of wood have been tried. These generally had wrought-iron feet and were stiffened by sheet steel plates and corner pieces, some having this material for the whole peripheral face. This type of gear case may have been successful when used on good track, but all which have as yet been tried have proved unsatisfactory for extreme conditions of service.

LUGS CAUSE TROUBLE

The lugs of the earlier patterns of pressed steel cases were also of sheet steel riveted on the vertical face, and later also to fasten the peripheral face of the top half of the case. After considerable experience it was found that the lugs, due to the additional strains, soon worked loose at the rivets and broke. A broken supporting lug proved to be a difficult thing to replace, because on account of its special pressed shape new ones could not be made in the shops, but had to be purchased from the original suppliers. It was also almost impossible to fit a second lug properly because of the difficulty of matching and fitting new rivets into the distorted holes in the gear case.

Many instances have occurred where the pressed steel lugs have been fractured even when the rivets have remained firm. This has come as a surprise to many a rolling stock superintendent in view of the fact that under exactly similar conditions the cast lugs on old type gear cases were giving no trouble whatever. When a pressed steel lug has broken in the way described an examination of the material round the fracture showed that the shocks and vibration have caused a complete change in the structure of the material, and instead of being ductile it was granular and brittle.

After experiencing scores of such fractures, and with the results obtained with other types in mind, one realizes that for purposes of severe service the pressed steel type lug, no matter how fixed to the gear case, is not satisfactory. Some manufacturers now use steel castings for the lugs in place of the pressed pattern. They are fixed to the gear case by riveting and spot welding. Such lugs have now been thoroughly tested, and they have proved their superiority over the preceding types.

Gear cases are usually fixed to the motor by either two or three bolts passing through the lugs which project from the top half of the case. If these bolts are allowed to get loose the gear case will drop out of alignment and stresses due to vibration and jolting will then be greatly intensified.

The method adopted on certain modern motors of providing for carrying the gear case on lugs centrally situated on the case, *i.e.*, in line with the middle of the gear teeth constitutes the greatest improvement on the more general arrangement that has up to now been tried. In this type the lugs on the gear case have to withstand direct pressures only, whereas on the older types they are subjected to heavy bending moments also, due to the center of gravity being outside the supporting faces. An additional clamp consisting of a horizontal bolt fixed near the top is also provided in many cases and serves to complete a first-class job. In a few instances a horizontal bolt support is provided for on the old type of gear case, but even where it did not originally exist, the author has found it advantageous to adopt the arrangement by fixing an angle iron bracket to the motor casing and a simple fixture on the gear case. The addition is effective in steadying and prolonging the life of the gear case.

Too small a clearance between the gear and the side of the gear case often causes severe rubbing of the gear against the case due to wearing of the vertical faces of the motor suspension bearings. This soon destroys the gear case and, moreover, is objectionally noisy in the process. Practically all equipments will allow of the use of sufficiently wide gear cases to give at least 5/16 in. side clearance.

Convenient Lamp for Tunnel Inspections

BY G. R. THAYER
Catenary Engineer

An inspection lamp for tunnel and emergency work which has proved indispensable in inspection work on one property is shown in an accompanying illustration. The outfit consists of an automobile lamp, a piece of ¼-in. rubber hose about 6 ft. long and a small tank of Prestolite such as is used on motorcycles or automobiles. Holes were drilled into the top and sides of the automobile lamp and two handles were attached to it. In addition a leather case for the tank was made and fitted with a strap to go over the inspector's shoulder.

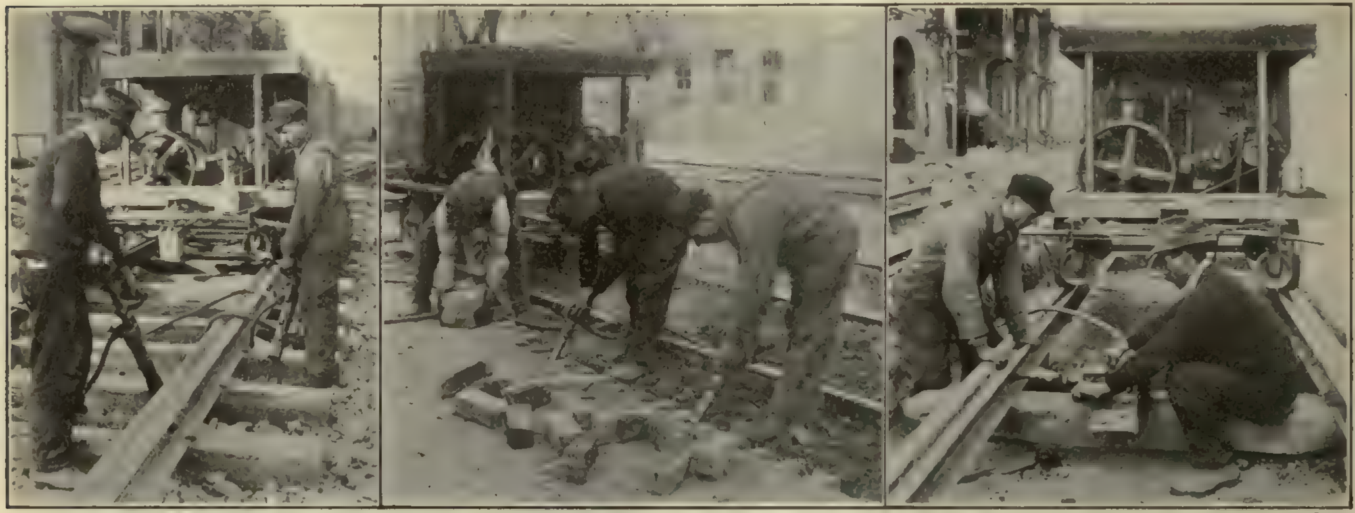
PORTABLE LAMPS IN USE BY TUNNEL INSPECTOR

This is a very convenient equipment to carry, and by means of the strong white beam, a tunnel inspector can locate cracked insulators or other defects before actual breakdown occurs. The equipment of a 3000-ft. tunnel is inspected twice each day with the aid of this outfit, so there is small chance for an insulator at any one of the forty stations failing without such failure being quickly detected. The total weight of this equipment is 17 lb., and at the present rate of inspection one tank charge will last about two weeks. These emergency lights have proved useful in several directions as they can be used at night in making temporary repairs on the line and in inspection work.

Varied Uses of a Pneumatic Tamping Outfit

BY CHARLES BRENNAN
Engineer Maintenance of Way, United Traction Company, Albany, N. Y.

The acuteness of the labor situation in 1915 necessitated a substitute for track laborers, and as the larger steam roads in the East during the seasons of 1914 and 1915 were using pneumatic outfits with excellent results in ballasting track, this company turned its attention to the tamping question. After going into the situation thoroughly it was decided to try out the pneumatic type of tamper. An order was accordingly placed for equipment for a trial test, and upon the completion of this test, which was highly satisfactory, an order was placed for a gasoline-engine-driven pneumatic tamping outfit. The following description shows to what varied uses such an outfit can be put, and the economies which are effected thereby.



USES OF A PNEUMATIC TAMPING OUTFIT: AS A TAMPER; FOR TOOTHING OUT POCKETS IN BRICKS; AS A DRILL FOR TIE RODS AND BOLTS

The first outfit obtained was gasoline-engine driven and it was purchased in 1915. With this equipment 12,714 ft. of track was tamped between Oct. 1 and Dec. 2, 1915, in addition to miscellaneous jobs completed. In the spring of 1916, a 10-hp. motor-driven outfit was put into service as being more economical for an electric railway, although it had to be towed, whereas the gasoline outfit was self-propelled. Both outfits came from the Ingersoll Rand Company.

At present a test, namely, that of using four guns instead of two, by the substitution of a 15-hp. motor for a 10-hp. motor and by changing to a larger pulley, which an Eastern railway property is trying out, is being watched with considerable interest. If the test proves successful, it is the intention of this company to remodel its outfit accordingly, as it now operates but two tamping guns. A compressor outfit mounted on a wagon that will operate from four to six guns will be built in the United Traction Company's shops during the coming winter.

In reballasting, where tracks are being reconstructed in connection with improvement of streets, and where traffic is being carried on continuously on both tracks, an outfit mounted on a wagon with wide tires is easier to handle than one equipped to run over tracks, since it weighs in the neighborhood of 4500 lb. Where track is being reconstructed without traffic operating over it, the latter outfit can be placed on the tracks and can follow up the work, the operator moving the machine along as required. The present outfit is operated at a working pressure of from 70 lb. to 80 lb. without objectionable noise.

Under continuous traffic conditions, the average cost of hand tamping 6 in. to 10 in. of crushed stone ballast is approximately 15 cents per foot of track. This cost, however, is increased where a second tamping due to settlement is necessary or where the ties are not absolutely on a solid bearing, as cracks in the concrete base will appear where concrete is poured under traffic. This condition is minimized when the track is tamped by the pneumatic outfit, as the stone underneath the ties is very compact. Also, indifferent tamping by hand is eliminated. As the tamping guns work at any angle this outfit is especially efficient in tamping ties in special work and in corners where a tamping pick or tamping bar would be useless.

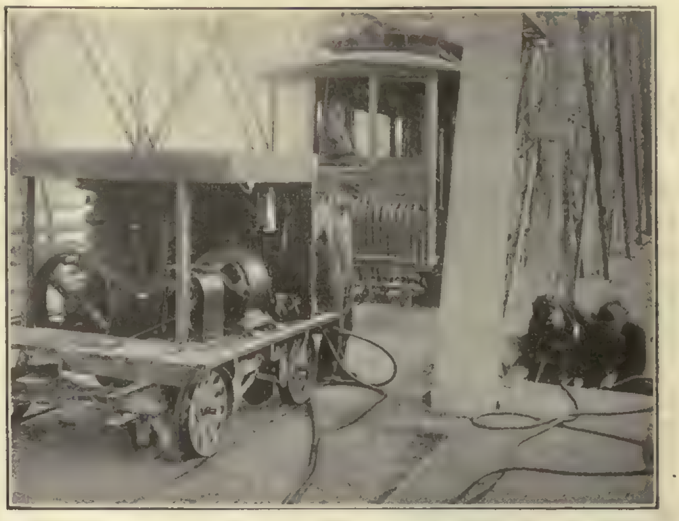
The average cost per day of tamping in 1915 by the pneumatic outfit was as follows:

DISTRIBUTION OF TIE TAMPING COSTS

Operator	$2.75
Two tampers	4.20
One ballast distributor	2.00
74.6 kw.-hr. at 1 cent per kilowatt-hour	0.746
0.3 gal. compressor oil	0.075
0.5 lb. Polarine cup grease	0.045
Overhead, charges based upon a life of ten years, at 6 cents per tie (180 ties considered a day's work)	1.08
Total cost per day	$10.896
Cost per tie	0.065

This tamping outfit cost about $1,300, the two tamping guns $100 each, and the tamping bars $1.75 each. As the pneumatic outfit is still engaged on tamping track, the average cost for 1916 has not been compiled, but undoubtedly will be higher, due to increased wages paid this year to all classes of labor. These figures serve to show a saving of approximately 56 per cent. A true comparison is the net result at the end of the season, and to keep the actual cost a job order is assigned to cover the operation of the tie tamper for the season in connection with a job order issued to cover the particular reconstruction job. At the completion of each job the cost of ballasting can be readily obtained. Another factor to be considered is the increasing number

THE PNEUMATIC TAMPING OUTFIT AS A DRILL FOR CUTTING OUT CONCRETE



THE PNEUMATIC TAMPING OUTFIT AS A BLOWER FOR REMOVING RUST FROM STRUCTURAL WORK

of laborers required on reconstruction work. The tamping outfit will take the place of at least ten laborers, and these laborers can then be used to good advantage ahead in tearing up and reconstructing tracks. Laborers were needed very badly during the past summer, and as most way engineers know there was not a job this year that had half its quota of men.

The municipal engineers of the several communities through which this road operates were so well pleased with the work of the pneumatic tamper that they requested that it be used on certain jobs, and having only one outfit we were kept busy moving it to the various municipalities when we could do so consistently.

Excellent results in the breaking up of concrete base have been obtained by the following procedure. Rather than work continuously off the face of the concrete, as it has been our experience, the base can be removed more quickly by a series of trenches and cross trenches, and the slab between can be pried up and broken off with sledge hammers. The laborers operate guns with dull pointed bars at an angle of 45 deg. and at about 2 in. or 3 in. from the face, at the same time using the gun as a lever to pry up the concrete slabs. If they try to take off too much the drill will stick. In order to effect an economy it is necessary to let the men cutting trenches in the concrete get a good start so that the laborers breaking and loading the concrete will not be delayed.

In order to clean bridge rollers and seats from rust successfully it is necessary to remove the guns and cut down the opening in the hose to a small size, as the compressor will not build up or hold the required working pressure with a ¾-in. hose connection. This scheme was used on one of the big bridges and better results were obtained by using one line of hose instead of two. In removing rust one laborer uses a sharp instrument to break up scales, dirt, etc., and the air blast will take care of the rest.

For drilling holes up to 1¼ in. in diameter two Thor air drills are used to operate in connection with the pneumatic outfit and the results so far to date have been very satisfactory. It is proposed by this company to use the outfit for drilling bolts and tie-rod holes in the short pieces of rail which are cut during the winter months as soon as the tamping work is completed. This will not only effect a saving but it will speed up the replacement of broken rails.

Anyone who ever attempted to pocket out half bricks preparatory to laying new blocks knows what a tedious and unsatisfactory job it is. As a rule, the whole brick adjacent breaks off, which requires that it come out also. By using a chipping hammer a series of sharp blows does the work without breaking the adjacent block. In order, however, to secure a good bond in the toothed portion it is necessary thoroughly to clean the cement out of the groove of the old block. In cleaning the old block the brick is placed against the edge of the curb, and a dozen bricks can be cleaned, as against one by the hand method. Not much cleaning of brick has been done on the street, the tamping requiring the machine almost constantly. The old bricks are hauled to the storage yard, and when the outfit is not in use it will be used to clean this old brick.

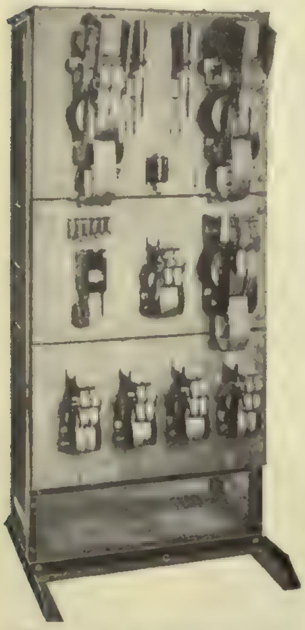
These examples show how an outfit of this type can be used, and it is necessary for every way engineer to be on the lookout for all labor-saving devices if an indication of the rising labor market is to be taken as a criterion.

Flood-Lighting Railroad Yards

The accompanying halftone shows the appearance of a railroad terminal illuminated with Western Electric-Davis flood lamps which do not throw out a defined and concentrated beam, but rather tend to spread the light uniformly over the section on which they are directed. This system was demonstrated at the recent convention of the American Electric Railway Association at Atlantic City, where the railway men in attendance manifested much interest in it.

RAILROAD YARD ILLUMINATED BY FLOOD-LIGHTING SYSTEM

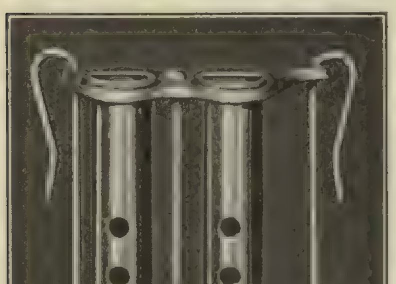
A Large Automatic Controller



AUTOMATIC CONTROLLER FOR LARGE D.-C. MOTORS

The controller shown in the accompanying illustration is a recent development of the Industrial Controller Company of Milwaukee, Wis., intended for use with large direct-current motors. This controller combines both current limit and time limit acceleration, thereby securing protection not only to the motor by means of the current-limit acceleration, but preventing too rapid acceleration of the motor under light loads. The controller consists of a number of large magnetic contactors, the first of which is equipped with a powerful blowout and arcing shields. The acceleration is accomplished by means of a master solenoid at the left of the panel, which upon closing energizes the coil of the large magnetic contactors successively, thereby closing the switches and bringing the motor up to speed. The acceleration of the master solenoid is retarded by means of an air dash pot, and in addition by a braking magnet, which in turn is controlled by a current limit relay at the center of the panel. When the current in the motor exceeds a predetermined amount, the master solenoid is prevented from operating until the current is reduced to the amount for which it is set. On the controller illustrated, magnetic switches with blowouts are provided for both sides of the line and each are equipped with overload relays.

Metal Tickets for Registration of All Classes of Fares

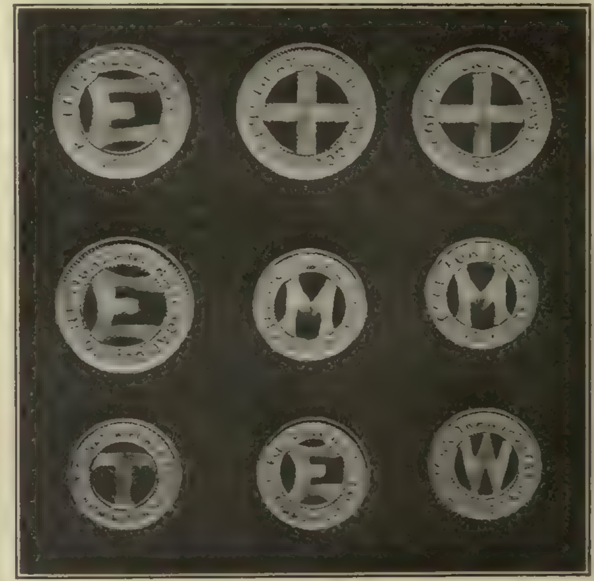


TWO-BARREL METAL TICKET CHANGE CARRIER

The metal ticket is a recent refinement in the registering fare box system of fare collection. When it is used in conjunction with the familiar clock register, this system plus the metal ticket makes possible the complete application of the double-check system, which has been quite generally accepted as an efficient one on a large number of important properties. On those properties where the the ticket fares represent a large proportion of the total, in certain instances as high as 86 per cent and even 96 per cent, the registering of tickets is a very important consideration since this, and the release of tickets for re-sale by the conductors, accomplished pronounced economies in the accounting department and place an additional safeguard around each fare.

The new metal tickets of the Johnson Fare Box Company for use in conjunction with its standard fare box equipped with two extra cyclometers (described in the Jan. 15, 1916, issue of ELECTRIC RAILWAY JOURNAL, page 136) provide a means of registering all classes of fares. These tickets are made of German silver in such form as to make counterfeiting difficult. A letter in the middle is used to indicate the name of the town, to prevent broadcast counterfeiting, and the letters may also be varied for different classes of fares in one city. As planned for Mobile, Ala., the small six-for-a-quarter ticket has an "M" in the center, the employees' pass (a metal ticket of the larger size) has an "E"; and the passes for mail carriers, policemen, etc., a cross. These are shown in an accompanying illustration.

The tokens are punched out around the letter in the center to distinguish them from coins, and they are made in two sizes, one slightly smaller than the dime and one slightly smaller than the nickel. Tickets of the same value are made of the same size, although they may have different classifications, as noted above. The lettering and geometric lines on the tickets, and their high intrinsic value, all conduce to make counterfeiting costly. The smaller tickets will cost from $10 to $12 a thousand and the larger ones $12 to $14. They can be used almost indefinitely.



METAL TICKETS FOR USE IN CONNECTION WITH REGISTERING FARE BOX

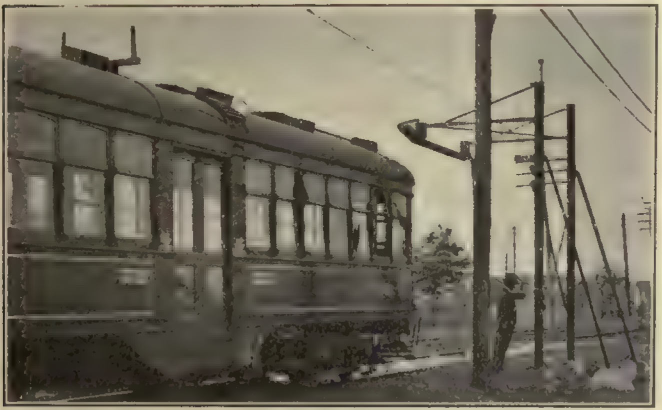
The system of collection advocated by this company in conjunction with the metal tickets provides a registration for every passenger, regardless of the class of fare paid, and a double check on all cash and ticket fares. The passenger drops his dime, nickel, pennies or metal ticket into the fare box, and at the same time the conductor "rings up" the fare on the clock register inside the car. Transfers are registered on a separate dial of the clock register. After the platform has been cleared the conductor grinds the coins and tickets through the fare box, registering them and releasing them for use in change or for resale. The four dials on the box register separately the three classes of coins and tickets of two denominations, and give the total of all fares in number of fares. The box registration plus the transfers indicated on the car register corresponds with the total of both sides of the car register, giving the double-check—the manual registration against the mechanical recording of cash and ticket fares. This possibility of registering the metal tickets as well as coins eliminates the principal objection to tickets and precludes the possibility of substitution of one class of fare for another.

The sale and handling of the metal tickets by the conductor is facilitated by the use of a metal ticket change carrier just put out by the same company. This is a simple two-barrel holder which the conductor wears on his vest, so constructed that a pressure of the lever drops six tickets into his hand to be given in exchange for a quarter. When two sizes of tickets are used, these carriers are made with two sizes of barrels to accommodate them.

Car Stop for Highway and Grade Crossings

Virginia Railway & Power Company Provides Automatic Protection on the Ocean View and Bay Shore Division by the Use of This Safety Device

For the past two years the Virginia Railway & Power Company has had in use on its Ocean View and Bay Shore Divisions an automatic car stop invented and patented by A. Taurman, superintendent of rolling stock of the company. The stop is said to have proved very successful. The principle involved is as follows: On each side of a crossing there are two contact devices which unless de-energized manually will bring a car to a sudden stop through the agency of a contact spring mounted on top of the car and connected in circuit with an electro-pneumatic valve.

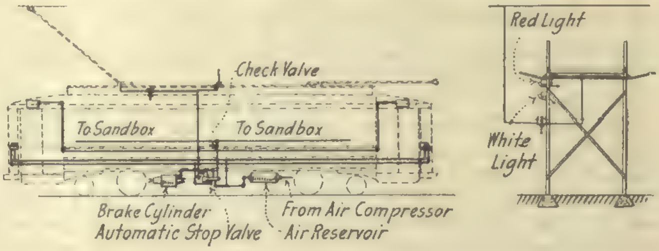


CAR PASSING OVERHEAD STEEL STRUCTURE, SHOWING DETAIL OF SPRING CONTACT ON TOP OF CAR AND INVERTED CHANNEL

In applying the stop, two steel overhead structures were erected on each side of the crossing, each carrying an inverted steel channel. These were located 150 ft. and 400 ft. respectively from the grade or highway crossing. The channels are energized from the trolley line through switches which close automatically, and are de-energized by the manual operation of the switches. At the outer or distant stop the automatic closing switch is placed on the steel structure. The switch controlling the energizing and de-energizing of the channel at the inner stop is located on the far side of the crossing so that it is necessary for the platform man to cross the crossing in order to de-energize this channel.

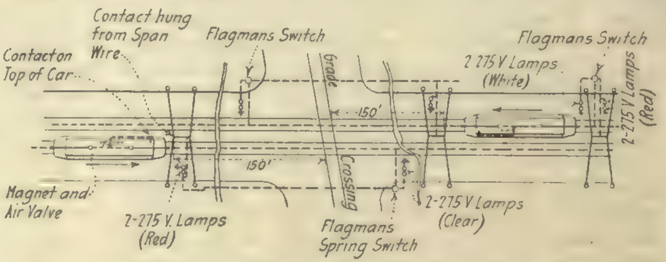
By means of the electro-pneumatic valve on the car provision is made for supplying air to sand the track, for supplying air to a small cylinder on the circuit breaker which cuts off the current, and for supplying air to the brake cylinder to apply the brakes. In addition to the operation of the valve through the spring contact on the top of the car, it can also be brought into action by means of a pull switch operated by a cord extending the length of the car. By means of this cord, the conductor can easily cause the car to make an emergency stop. When operated from either source the magnet will operate the valve in 1/18 second. The cycle of operations in passing a crossing is as follows:

On approaching within 400 ft. of a grade crossing the car encounters a danger signal at the first stop, and the motorman brings his car to a stop in the usual manner. The conductor then goes ahead to operate the switch which cuts out the danger signal, de-energizes the stationary contact and displays the clear signal, after which the motorman proceeds. On reaching the stop nearest the crossing the motorman brings his car again to a stop. The conductor then crosses the grade crossing, after properly flagging it, operates the switch in the same manner as described before, cutting out the danger signal and displaying the white signal for the motorman to proceed. If the motorman fails to bring his car to a stop, in approaching the grade crossing, then the spring contact on top of the car, engaging the channel, energizes the magnet of the electro-pneumatic valve, causing it to produce an emergency stop. The conductor or motorman must then alight from the car and reset the valve before the car can proceed, as power cannot be restored to the car nor can the brakes be released until this electro-pneumatic valve has been reset by hand. This valve is purposely so located that it is necessary to get off the car to perform this operation.



ELEVATION OF CAR AND OVERHEAD STEEL STRUCTURE SHOWING ARRANGEMENT OF AUTOMATIC CAR STOP

Mr. Taurman has recently arranged for the development and marketing of this device by the Consolidated Car Heating Company, Albany, N. Y., which furnished the equipment for the Virginia Railway & Power Company.



RAILROAD CROSSING SHOWING INSTALLATION OF AUTOMATIC CAR STOP

Local engineers are conducting a research regarding the return circuit conditions on the property of the Omaha & Council Bluffs Street Railway with a view to possible improvement in the distribution system. The United States Bureau of Standards will take the results of this work, which are understood to be practically ready for the purpose, and will work them up into a complete report.

NEWS OF ELECTRIC RAILWAYS

Traffic and Transportation
Financial and Corporate **Personal Mention** **Construction News**

P. R. T. COMPANY RENEWS PROPOSAL TO CITY

Further Conferences Proposed With Prospects Reported Good for Settlement Soon

Ellis Ames Ballard, chief counsel for the Philadelphia (Pa.) Rapid Transit Company, announced at the public hearing on Nov. 17 before City Councils' joint committee on street railways and finance that the company was willing to enter an agreement with the city for the operation of high-speed lines, with the 1914 Taylor tentative agreement as a basis. The statement made by Mr. Ballard follows:

"The company appreciates the opportunity of stating to you and through you to the public its attitude in respect to the equipment and operation of the city high-speed lines.

"In May, 1914, as a result of conferences held between representatives of the company and Mr. Taylor, who was then director of city transit, a basis for a suggested agreement was prepared, which was dependent, however, upon the rapid transit company securing financial aid from the Union Traction Company. The essential features of this tentative agreement were:

"1. The program at that time was limited to Frankford, stopping at Bridge Street; Broad Street Subway, stopping at Pike Street, with branches and a delivery loop, and Darby. It was estimated by the director of city transit that the contribution of the company for equipment of these lines would be slightly less than $12,000,000.

"2. Exchange tickets were to be abolished in order that the two systems could be operated as one. The company was to receive a partial consideration for this concession. A year later Director Taylor suggested some changes in this consideration which you will find in his official report for the year 1915.

"3. In so far as the competition of city-built lines depleted the current net earnings of the company's own system (except net earnings from exchange tickets) that loss was to be made up to it by a preferential payment out of the earnings of the city's lines. That is to say, those earnings were to be applied (1) toward paying 6 per cent upon the cost of equipment furnished by the transit company; (2) toward making up any loss in its said current net earnings which the company had experienced from this competition; (3) toward meeting the interest and sinking fund charges on city bonds, and (4) the balance of earnings to be divided between the parties in proportion to their contribution to the city lines.

"Two and a half years have elapsed since these conferences, and the situation has changed materially in many respects. First, the Union Traction Company has not up to the present time agreed to furnish the necessary financial assistance. Second, since the suggested agreement the city has provided for extensions and additions to the original Taylor plans which materially increase the commitment of the operator and alter the financial results to be fairly expected. Third, the cost of all items of construction and equipment are much greater than the original estimates, so that the company now estimates that to equip even the lines originally included in the 1914 plan will take from $17,000,000, as against $12,000,000 then estimated.

"However, I wish to say on behalf of the company that it stands ready to enter into a contract with the city of Philadelphia incorporating the spirit of the 1914 plan, with the 1915 amendment as to exchange tickets, and that it will go just as far in this matter as its credit will permit. It will be necessary, however, to make such financial arrangements as may be required to enable the company to secure the money not only for the equipment of city-built lines, but for its own current needs for refunding and extensions. The problem does not seem to us to be insurmountable, but is one which will require careful thought and concessions on both sides. The understandings which have been reached between the company and the city's representatives are not to be confounded with the form of contract which has been submitted to you by his honor, the Mayor. That is a draft in the preparation of which the rapid transit company representatives have had no voice. As already stated, however, we stand ready to carry out the understandings of 1914 and 1915 to the extent of our ability, and for that purpose will be glad to join with the city in the preparation of a contract which shall fairly protect both parties."

Chairman Gaffney, of the finance committee of Councils, has invited officials of the Philadelphia Rapid Transit Company, the Union Traction Company and the Market Street Elevated Railway to confer on details of the future contract with himself, the Mayor and Chairman Seger, of the street railway committee.

At the meeting of the directors of the Philadelphia Rapid Transit Company held on Nov. 20, E. T. Stotesbury and T. E. Mitten were appointed a special committee of the board to negotiate with the representatives of the city in connection with the proposed agreement between the city of Philadelphia and the company for the operation of the city-built high-speed lines.

DALLAS NEGOTIATIONS CONCLUDED

The proposed franchises to be granted by the city of Dallas, Tex., to the consolidated street railway and the new lighting company to be organized by J. F. Strickland and C. W. Hobson were approved at a conference on Nov. 19 between city officials and the Strickland-Hobson interests. There remains the taking of the straw vote by which the citizens of Dallas will pass on the proposed valuation of $8,500,000 for the street railway properties. The vote will be taken within the next few weeks, and if the valuation of $8,500,000 is approved instead of the valuation of $7,100,000 as fixed by E. W. Bemis after a survey of the properties, the settlement will become a reality.

The lease by which the Strickland-Hobson interests will take over the operation of the Oak Cliff lines expires in 1935, and will give the new traction company control of all properties of the Northern Texas Traction Company within the corporate limits of Dallas. The lease gives Mr. Hobson the option to purchase the leased properties when the mortgages of the traction company are discharged. The Northern Texas Traction Company maintains the right to operate its interurban railway into the city. This company also agrees to complete the viaduct across the Trinity River. Rent to be paid by the Hobson company is based upon the sliding scale, beginning with $115,000 a year and increasing in the seventh year to $150,000.

The valuation agreed upon by the city and the utilities interests for the Oak Cliff lines is $1,665,760, as of Sept. 30, 1915. Since that date approximately $120,000 has been spent in betterments. If the Hobson company buys the traction company's properties it must pay $2,000,000, or if the city should take over the lines it will have to pay the 1915 valuation figures plus expenditures made up to the time of purchase.

The actual cost of the interurban terminal up to Sept. 30 is given at $1,301,516. With other bills to be paid and costs for other real estate to be taken in for the use of cars not having been transferred to the terminal company, the total cost of the terminals will be brought up to a figure estimated at $1,500,000. Additional property to be used for parking of cars, across Wood Street from the rear of the terminals, is to be acquired.

Arrangements are being made to place before the voters in pamphlet form all the details of the settlement, including a review of the negotiations and the new contracts and proposed franchises in full.

CHICAGO ALDERMEN RETURN FROM INSPECTION

Alderman Capitain, Chairman of the Local Transportation Committee, Gives Impressions of Ten Days' Study in Eastern Cities

The sixteen Chicago aldermen, members of the local transportation committee of the City Council, have returned to Chicago after their ten-day trip through the East to study city railway conditions. In an interview in Chicago with a representative of the ELECTRIC RAILWAY JOURNAL, Alderman Capitain, chairman of the committee, gave the principal impressions which the aldermen received as the result of their study. He said that the aldermen noted particularly the co-operation between the companies and the municipalities. Apparently the public could have anything it wanted in the way of transportation so long as it was willing to shoulder its proper part of the cost. The committee was impressed particularly with the progress which has been made in the electrification of steam railroads around New York City, and with the plans under way by the New York Central Railroad for the complete electrification of the West Side yards.

Mr. Capitain thought that Chicago was particularly fortunate in that conditions in the East gave to Chicago a greater incentive to better its transportation facilities, and afforded that city an opportunity to profit by experience. As an example of this, he said that Chicago had formerly considered a subway for surface lines only, while now it was evident that with a unification of the surface and elevated lines, the subway would need to be so constructed as to take care of the through service rapid transit of the elevated system as well. The delay in the Chicago work and study has also shown the necessity of laying out the subway system so that it could ultimately be expanded to make a comprehensive system. In Boston, conditions some time ago were such that it became necessary for the city to handle the constructing of its subways. This had necessitated the building of additional subway lines later at extremely high cost.

The committee was inclined to believe that the Boston situation came nearer than any other to the work that it will be necessary to carry out for Chicago. The members of the Chicago party were very much interested in the Cambridge station of the Boston subway because of the very efficient system of separating the routes of people leaving and entering the system. The Chicago situation in general would be simpler to solve than that in Boston, because the layout of Chicago required less transferring of passengers.

Alderman Capitain thought that Chicago had also been particularly fortunate in the 1907 settlement. He believed that the 1907 ordinances had worked out very satisfactorily and had been a good financial arrangement, except that some charges were made against the nickel which should not be made. In these unwarranted charges he included an item of some $8,000,000 which the companies had been forced to spend in paving. This was capitalized into the physical valuation of the property. He said that when one considered that the street railways increased property value from 100 to 1000 per cent, it did not look reasonable that the car riders should pay this paving bill. If that amount of money had been allowed to go into service to the direct benefit of the riders, it would have meant a great deal to them. The Chicago companies were also forced to repair this pavement, which they did not wear out, and this had also run to several millions of dollars since the 1907 ordinance. They were also required under the 1907 grants to clean 16 ft. of the street and were now paying between $300,000 and $400 000 a year for this. The outlying district and the real estate dealers had been so insistent in having the city take advantage of the ordinance provision for a certain amount of extensions each year that the car riders had paid the price and the property owners reaped the benefit.

The feature of the Chicago ordinances which allowed the companies to earn a certain percentage on their capitalization and after that to divide the net profits with the city Mr. Capitain thought to be a good one, as it furnished an incentive to the companies to scrutinize expenditures carefully. He contrasted this with the Cleveland arrangement, guaranteeing a return of 6 per cent to the railway.

The franchise situations in the cities visited were discussed freely with the various companies and the municipal boards. From these discussions the committee got the general impression that the indeterminate form of franchise was probably best suited to modern conditions. This form of franchise can be written to provide for regulation by a competent commission with some freedom in the exercise of its supervision, but recognizing the underlying principle that a sufficient return on the capital investment as determined by experts must be allowed.

In speaking of the municipal regulation of transportation companies, Mr. Capitain remarked that one of the difficulties had been that the operating company would secure a very high-grade man paying him a salary of $25,000 or $30,000, while the city would retain a man at $6,500 or $7,000 a year to supervise the work of the railway. He thought that the only successful way to meet this situation was for the city to retain as its representative a man fully as capable as any in the employ of the railway. He also remarked that the farther such regulatory bodies could be removed from politics, the better would be the results obtained.

The trip was considered to be a very successful one. Mr. Capitain remarked that everyone who met the committee went out of his way to give the members every opportunity for inquiring into the methods of the various systems, and that the city of Chicago ought to be grateful for these courtesies. He is of the opinion that as a result of the trip, the committee is very much better prepared to receive the report the Chicago Traction and Subway Commission and to recommend more intelligently than before to the City Council as to what ought to be done.

CLEVELAND POWER HEARING CONTINUED

Warren Bicknell Substituted for Joseph Alexander as Arbitrator on Account of Accident—New Bid from Municipal Plant

The hearing on the power contract between the Cleveland (Ohio) Railway and the Cleveland Electric Illuminating Company was held up for some days last week because of an accident to Joseph Alexander, one of the arbitrators, which resulted in a fractured knee. On Nov. 16, however, the hearing was resumed with Warren Bicknell, president of the Cleveland Construction Company, in Mr. Alexander's place.

Peter Junkersfeld, vice-president of the Commonwealth Edison Company, Chicago, was the principal witness that day. He said he considered the contract proposed as very advantageous to the railway because of the low rate. So far as the municipal light plant's bid was concerned, Mr. Junkersfeld said it was a desirable one from the standpoint of price, but there seemed to be no assurance that the municipal plant could give continuous and dependable service. His own company could not take a contract at the prices made to the railway in Cleveland. In his opinion the Cedar Avenue power house of the railway should be dismantled.

F. W. Ballard, former light commissioner of Cleveland, was the witness on Nov. 20. He estimated that the Illuminating Company would have an investment of $1,985,000 in equipment to take care of the contract. On this he declared the company would make a profit of $202,442 a year above the 7 per cent that should be allowed on the investment. Mr. Ballard said the contract was also advantageous to the Illuminating Company because it would reduce the unit cost of production, and because the railway agrees to pay the extra cost of coal above $2.25 per ton. He considered that $2.40 a ton would be a good average price for coal for the next five years.

The Cleveland municipal light plant submitted a second bid for the power contract of the Cleveland Railway to Street Railway Commissioner Sanders on Nov. 20. Light Commissioner Davis said that it is at the rate of 5.02 mills per kilowatt-hour. He said he had figured the rate at 12½ per cent above the cost of production. If the plant received the contract, Mr. Davis said he would recommend the purchase of two 15,000-kw. turbo-generators at once, and if it did not secure the business, one such generator should be purchased any way to take care of the increased domestic business that is awaiting.

TOLEDO COMMITTEE RESUMES SESSIONS

Franchise Allowances, Fares, the Purchase Fund and Hauling Freight All Considered Before the Street Railway Commission

Henry L. Doherty, chairman of the board of directors of the Toledo Railways & Light Company, Toledo, Ohio, met with the street railway commission of that city on Nov. 16 to continue the discussion on the proposal to establish a community company to take over the railway property. The proposed rate of fare was the first question taken up. Mr. Doherty said it would be possible to have a low fare, if that was the supreme object of the city. The aim of the present company had been to furnish good service. One way to reduce the fare was to cut out stops. In Cleveland 1200 stops had been eliminated. Mr. Doherty suggested that if fares were to be reduced, a start should be made with the present fare as a basis. The next step in revision downward could be seven tickets for a quarter, with a 1-cent charge for transfers. In case a further reduction was decided upon, the charge for transfers could be removed.

Mr. Doherty opposed the idea of a stated allowance per car-mile for operation and maintenance. He said that the management would be more efficient if left to operate as cheaply as possible. He also objected to the clause in the proposed franchise making it impossible to sell bonds. If three-fourths of the stockholders favored an issue of bonds, their sale should be allowed.

On the following day the clause fixing a maximum fare at 5 cents was taken up. Mr. Doherty told the commission that the matter should be left open, so that 10 cents could be charged on owl cars. He argued that it might eventually be advisable to adopt the zone system of fares. With such a provision in the contract, this change would be impossible.

Another question was the manner in which the proposed purchase fund should be disposed of, in case the city decided not to take over the road. John Usher, president of the street railway commission, contended that it should go toward amortizing the debt of the company or become the property of the city. Mr. Doherty suggested that it be turned over to the equalization fund and the company allowed to operate at a lower rate of fare for a time.

Judge Emery, in discussing the question of operating freight cars over the city tracks, said he believed that a lower fare could be established through a more economical handling of freight over the tracks. Mr. Usher thought people would object. Mr. Doherty suggested that food prices in the city would be reduced if freight could be hauled over the city tracks by electric power.

On Nov. 20 an agreement was reached between the commission and Mr. Doherty that an equalization fund shall be accumulated automatically in case the rate of fare produces a greater income than is required for operating, maintenance and other expenses, and 6 per cent dividends to the stockholders. When the fund gets below $100,000 the company may increase the fare to the next higher rate and when it exceeds $200,000, Council may order the next lower rate on the proposed schedule put into effect.

It was agreed that the matter of hauling freight should be left to the City Council. The clause limiting the fare to a maximum of 5 cents was discussed, but was left unchanged for the present. It seems that members of the commission do not expect the zone system to be introduced for some time. Commissioner Cochran said that, in the case of men working at night, it would not be right to charge them a fare higher than those who work in the daytime. Mr. Doherty argued that the fare on owl cars should be 10 cents and that employers would help to pay the fare of men who work at night.

Mr. Doherty objected to a clause which would allow the city to grant a franchise to another company in a prescribed territory. Commissioner Cochran supported him in this and said a city had about as much use for two street railways as for two telephone companies. Two companies operating the same kind of service in a community were a nuisance.

As to an amortization clause, Mr. Doherty said he would accept the one used in the Cleveland contract, but believed a clause a little more favorable to the city could be drafted. He was asked to prepare one.

FULL SERVICE IN INDIANAPOLIS

Governor Ralston, Holding Out Little Hope to Union Men, Presents Modified Demands to Company, Which Rejects Them

A committee representing the union street car men who quit work in Indianapolis, Ind., refusing to sign the company's individual working agreement, appeared before Governor Ralston on Nov. 16. They left with him a copy of a proposed working agreement which they wished him to present to Robert I. Todd, president of the Indianapolis Traction & Terminal Company, in an effort to resume negotiations between themselves and Mr. Todd. The modified agreement differed from their original demands which caused the company to break off negotiations, principally in that it did not provide for a closed shop. The rate of wages asked for originally also was reduced.

The Governor discussed the matter informally with the committee of union street car men and business agents of labor organizations. He said he would present the matter to Mr. Todd and they could return for an answer the following day. He held out no hope of being able to accomplish anything for them. During the discussion, the fact that the Governor called out the State militia during the street railway strike in 1913 was mentioned. The Governor then advised the committee that the administration intended to stand for law and order at all times, and that in the case mentioned he had brought the militia to the city entirely on his own responsibility.

Upon the matter being submitted to him in a letter from the Governor, Mr. Todd immediately wrote to Governor Ralston. His letter set forth the situation fully. Mr. Todd said in part:

"This company now has a full complement of employees, who are working under conditions and wage contracts satisfactory to them and to the company. All employees of this company engaged in car service are employed under a uniform agreement covering wages and working conditions. Less than 20 per cent of the car service men in the employ of the company prior to Nov. 9 refused to accept the terms of employment agreed to by more than 80 per cent of their fellows, and left the company. Some of this minority abandoned their cars and passengers in the public streets. They were invited and urged to remain in our service on the very terms accepted by an overwhelming majority of the men. They refused. Although in numbers a small minority, they were determined to dictate terms for a majority, and to force the company to discharge that majority if it did not accede to their demands. It should be very evident to all that the present contracts cannot be set aside or ignored. They are signed by all present employees engaged in car service. Both the men and the company recognize them as valid and binding upon them. It would be intolerable discrimination to have more than one form of contract among our men.

"We manifestly could not for one moment consider the replacing of any of the loyal, efficient and reliable men who are now operating the cars, in order to make places for men who have so little regard for their fellows and the public service that they first demanded the discharge of 80 per cent of the motormen and conductors unless the company forced them into their union, and when they failed in that, deserted their cars, and in some cases left carloads of passengers stranded in the streets. Therefore, as we now have a full force of employees, who by their loyal and faithful service have earned the runs they now hold, and the working agreement with car service men has now been signed by every man engaged in car operation, nothing practical could be expected to result from such a meeting as has been proposed by these former employees."

Otto Ray, president of the Central Labor Union, complained to Mayor Bell of the activities of the police. The Mayor said: "The duty of the police force is to maintain law and order. I do not intend again to permit conditions such as occurred three years ago. The police force will be used to protect the rights of all citizens."

On Nov. 18 at a night meeting of the former employees a strike vote was taken, but the purpose of this vote or the result of same was not announced by the labor leaders until Nov. 20, when printed cards were circulated, stating that a "street car strike" would be in effect at 11 o'clock that night. A mass meeting was held at Labor Hall, at which it is reported those who attended were incited by radical speakers to go out on the streets and damage the cars of the company, to be at the carhouses early in the morning and prevent men from taking out their cars. The excellent organization of the police department, however, prevented even the assembling of groups of labor sympathizers on the streets, and the company maintained all its schedules without any interruption or disorder.

The action of Amalgamated Association officials in calling a "strike" of men who had ceased all relations with the company ten days previously, and the reported inciting of these men to interfere with the cars in violation of an injunction of the United States court, was taken the same day that a committee of the American Federation of Labor, in session at Baltimore, reported that "we, therefore, recommend that any injunctions dealing with the relationship of employer and employee, and based on the dictum, 'labor is property,' be wholly and absolutely regarded as usurpation, and disregarded, let the consequences be what they may."

RAILWAY HELPS TO DEFEAT BRIDGE

A bridge proposition was defeated in Pottawattamie County, Iowa, at the general election on Nov. 7 by a vote of two to one.

The proposition involved a bond issue of $200,000 by Pottawattamie County, Iowa, to aid in the construction of a free bridge between Omaha, Neb., and Council Bluffs, Iowa. The promoters of the project asked Pottawattamie County, Iowa, to pay $200,000 and Douglas County, Neb., to pay $600,000.

Douglas County, Neb., was not to vote on the question until next year, on or before June 1, 1917, but inasmuch as the plan failed to carry in Pottawattamie County, Iowa, it is improbable that the question will be voted on in that county.

The project was opposed by the Omaha & Council Bluffs Street Railway. The campaign of the company in opposition to the project consisted of the distribution on cars on the Iowa division of a series of short "talks" to the voters. Each "talk" remained on the cars two days. The company also published these talks and other matter in the newspapers of Council Bluffs, and did considerable advertising, in the form of readers, in the country papers throughout the county. It also arranged with an organization, formed to protest against the bridge bond measure, to mail to every voter in the county a letter giving reasons why taxpayers should defeat the bonds.

The free bridge committee also conducted a campaign. The committee took space in the papers, sent out circular letters and posted cards, and had workers at the polls.

LIBERAL POLICY REWARDED

A decision has been handed down by the Railroad Commission of California establishing rates for the San Diego Consolidated Gas & Electric Company, a subsidiary of Standard Gas & Electric Company, controlled by H. M. Byllesby & Company, Chicago. Existing rates for both gas and electric current were left practically unchanged, but the minimum monthly charge for electric service was reduced from $1 to 75 cents. Minor reductions were made in various rates, but these had been voluntarily offered by the company in submitting its case to the commission, which, in making the decision, upheld the principle of centralized management in public-utility operation. The commission, in handing down the decision, said:

"The testimony shows that the San Diego Company's policy towards its customers has been praiseworthy. The company has voluntarily made reductions in rates from time to time, has been liberal in the construction of extensions at its own expense, and has exerted itself at all times to give to its customers good service. The number of informal complaints against the company which have come to the commission has been relatively very small. A public utility which pursues such a fair and reasonable policy towards the public is entitled to consideration from the public authorities charged with the duty of supervising and regulating public utilities."

CO-OPERATIVE CONFERENCE BETWEEN OFFICIALS AND UNION

Following the signing of the working agreement between the Bay State Street Railway and the local branches of the Amalgamated Association, noted in the ELECTRIC RAILWAY JOURNAL of Nov. 18, page 1072, a conference was held between officials of the company and union representatives at the Quincy House, Boston, Mass., on Nov. 18 to promote mutual understanding. Twenty-nine days were included in the period which the negotiations leading to the signing of the agreement required. At the meeting last week nearly ninety men were present, including many heads of departments in the company, with delegations from each of the local unions on the system from Nashua, N. H., to Newport, R. I.

R. S. Goff, who is vice-president and general manager of the company, presided. Mr. Goff said that the agreement was regarded by both parties as one of the best possible. He believed that the negotiations which led to its conclusion were preferable by far to arbitration, and paid a tribute to the excellent spirit developed during the conferences. J. H. Reardon, for the union, said that the agreement was, in his opinion, the best thus far reached, and that the interests of the parties were identical. He hoped that the members of the union would prove that a contract with the union was as good as any other security on earth. President Sullivan of the company, who was also present, informally discussed the ways in which his hearers could assist in disciplining themselves and the members of their organization, and emphasized the need of rules and regulations in the conduct of a railway system.

INCREASE IN WAGES IN KANSAS CITY

P. J. Kealy, president of the Kansas City (Mo.) Railways, announced to the men during the first public concert by the company band that an increase of wages for trainmen averaging 7 per cent would go into effect on Nov. 16. The new schedule is as follows: First six months, 22 cents an hour; second six months, 23 cents; second year, 24 cents, and so on up to the eleventh year, when the rate is 30 cents. The minimum monthly wage is increased from $45 to $55. The advance for the newer men in the service is 1 cent, while the advances for most of the older men are 2 cents an hour. Men in the street sweeper service are to receive 32 cents an hour. Operators of one-man cars are to receive 2 cents an hour above the standard rate. Previous wage advances on the Kansas City Railways were as follows: April 12, 1907, 1 cent; May 16, 1910, 1 cent; Aug. 7, 1913, 1 cent, and immediately after the granting of the new franchise, on July 29, 1914, 1 cent.

In his address to the men, Mr. Kealy said that the wage increase was one of the items on his announced program of several months ago. He hoped to see the people connected with the company molded into one big family, the men owning their own homes, and permanently located in Kansas City and in their jobs. He said the company desired to see that the employees got a just and equitable part of the earnings, that the investors received a just and equitable return of their investment, and that the people of Kansas City got fair and reasonable service. With reference to safety work, Mr. Kealy said that as the claims against the company for accidents were reduced below a certain average normal figure, the wages would be increased above normal.

The increase of 5 per cent in the earnings of the company since April 1 is attributed partly to the co-operation of the employees, as a result of the welfare and similar work. The welfare program so far worked out includes the *Railwayan*, the monthly magazine; the jubilee, a great gathering at which 11,000 employees and members of their families were present; the organization of the band, whose first concert was the occasion for the wage-increase announcement; the free legal-aid bureau; the loan bureau, and the encouragement of athletics. Parts of the program now under way include the establishment of a savings and building loan fund, and the encouragement of the men to buy or build suitable homes; a pension system, and centralization of car headquarters.

WAGE REQUEST WITHDRAWN

Wage differences which have been a subject of discussion for several weeks between transportation department employees and the Denver (Col.) Tramway have been settled satisfactorily. The men have agreed to postpone their request for an increase. Herbert W. Joslin, chairman of the committee representing the men, is quoted as having said:

"The company has shown us its position in this matter, so that we believe in fairness the request for raise in wages should be postponed. While the present high cost of living would have made a raise more than welcome, we can see from the showing made by the company that we are not the only ones who have increased expenses to meet. There will be no further demand unless conditions change."

It is understood that investigations made by the men have brought out that Denver conductors and motormen are getting about the same wages that similar employees in other cities of the same size are getting, and with conditions as they are in Denver at present they have decided to let well enough alone. It is also stated by employees of the company that the excellent treatment of the men in other matters besides wages has had a great bearing on the amicable settlement of the question. At the meetings at which the matter was taken up tramway officials invited all the men in to see the figures on their side, and the committee presenting the request received every consideration.

ADDITIONAL GENERATING CAPACITY FOR TOLEDO

Henry L. Doherty, of H. L. Doherty & Company, who operate the Toledo Railways & Light Company, Toledo, Ohio, under contract, announced at Toledo on Nov. 20 that plans are being completed for a new central station for that city, which may have a capacity of 120,000 kw. and cost about $6,000,000. He said that such a plant will be capable of taking care of an increase of 100,000 in population. It is possible that it will be located on the old rolling mill property on the East Side, which is owned by Mr. Doherty, but if it proves that this property is too high for the purpose, the plant may be placed outside the city limits.

It is not the intention to abandon the Water Street plant, the capacity of which has been gradually increased to 80,000 kw. In all probability the city railway lines will depend upon the company for power, however they may be owned. In any event, the interurban roads will need additional power, and both the power and light business in the city is growing rapidly.

Mr. Doherty said he had asked M. R. Bump, chief engineer of the Doherty properties, to come to Toledo with all his plans, and thereafter the two will hold daily sessions until they are fully completed.

Mr. Morse Named as Pittsburgh Transit Inspector.—Edwin K. Morse was named as Transit Commissioner by Mayor Joseph G. Armstrong of Pittsburgh, Pa., on Nov. 6. The Council has confirmed the nomination.

Covington Dismissals Upheld.—Both the company and the men have announced that they will abide by the findings of the arbitration commission, filed in Covington, Ky., upholding the South Covington & Cincinnati Street Railway, Covington, Ky., in its right to discharge six employees charged with drinking while on duty.

Bay State Street Railway to Sell Parks.—The Public Service Commission of Massachusetts set Nov. 24 as the date for hearing a petition of the Bay State Street Railway for authority to sell amusement parks in Freetown, Dighton, Westwood, Methuen, Tyngsboro and Gloucester. In its recent decision in the company's 6-cent fare case, the commission intimated that such parks were not a source of profit to the company and suggested that they be disposed of by the management.

Petition for Abandonment Withdrawn.—In the ELECTRIC RAILWAY JOURNAL for Oct. 7, page 747, mention was made of the fact that Ansel M. Easton had applied to the Railroad Commission of California for permission to abandon the Burlingame Railway. The day before the time set by the commission to hear the application, Mr. Easton withdrew the application, having decided to continue the operation of the line. It is more than likely now that new equipment will be installed at an early date.

Shawnee Strike Ended.—After having been idle since Nov. 1 on account of a strike of motormen and conductors, the Shawnee-Tecumseh Traction Company on Nov. 18 resumed operation of its local cars and the interurban line from Shawnee to Tecumseh. An agreement was reached between strikers and the company through State Labor Commissioner Ashton and Mayor Stearns of Shawnee as a board of mediation. The agreement is a compromise.

Suggests Municipal Ownership for Cincinnati. — Carl Brannin, the manager of the People's Power League, sent a communication to the Rapid Transit Commission of Cincinnati, Ohio, and the conference committee of the Council committee on street railways on Nov. 17, in which he advocated the municipal ownership and operation of the proposed rapid transit loop and the surface lines. Mr. Brannin had been invited to make an address, but sent the communication instead.

Rehearing Asked in Valuation Case.—The Portland Railway, Light & Power Company, Portland, Ore., has filed with Public Service Commission of Oregon a petition asking for a rehearing in the case recently decided by the commission, fixing the valuation of the company's properties. Reconsideration is desired by the company particularly on the findings of the commission fixing the value of the company's working capital, reproduction costs, franchise, water powers, original cost and depreciation annuity.

Amalgamated Organizer Thorpe Dead.—John J. Thorpe, first vice-president of the Amalgamated Association, who conducted the Pittsburgh strike of a year ago and the unsuccessful strike of the Harrisburg (Pa.) Railways last summer, died at Hot Springs, Ark., on Nov. 19 from heart trouble and dropsy. He was forty-three years old, and is survived by his widow. By his tactics at Harrisburg Thorpe drew down upon himself the wrath of Mayor Meals of that city, who characterized him as "a mighty bad man."

Expediting Adamson Law Case.—The Adamson eight-hour law was held on Nov. 22 to be unconstitutional by Judge William C. Hook in the United States District Court at Kansas City, Mo. The court made it plain that the decision was not based on mature consideration of the merits of the case, but on expediency desired by all parties at interest because of the necessity of a final decision by the Supreme Court of the United States before Jan. 1, when the law goes into effect. Electric railways are specifically exempted from the provisions of the measure.

Horses in New York Until April.—The New York (N. Y.) Railways has informed the Public Service Commission for the First District of New York that it has been impossible to secure the storage-battery cars for the Madison Street and Avenue C line as rapidly as the company had expected because of the condition of the car-manufacturing trade, but deliveries would begin early next month at the rate of three to five cars a week. This will enable the company to equip the line with the new cars by April 1, 1917, and by that date the last of the horse cars to be operated on Manhattan Island will be retired. The commission accordingly granted an extension from Dec. 1 to provide such equipment.

Conference on Mill Tax in St. Louis.—City officials of St. Louis, Mo., and officers of the United Railways plan to confer on the subject of the mill tax and the duration of the underlying corporation's franchises. Richard McCulloch, president and general manager, Murray Carleton and A. L. Shapleigh, directors, will represent the railway. It is expected that the discussions of the company's proposals and the city's counter propositions will require several weeks before a bill embodying any compromise that may be reached is introduced before the Board of Aldermen. In a letter written several weeks ago to City Counsellor Daues, H. S. Priest, general counsel for the railway, declared that the company could not pay the mill tax, meet its obligations to bondholders and make improvements.

Springfield Company Appeals for Revision of Excise Tax.—The Springfield (Mass.) Street Railway has petitioned the Public Service Commission of Massachusetts for a revision of its payments to local municipalities under the excise tax law. The company contends that the average annual amounts paid in the last three years as an excise tax under the Acts of 1909, Chap. 490, are in excess of the average annual cost to each city and town named of the work done by it under the provisions of this act during the three years. Under the law the money received by the municipality is to be used in track construction and maintenance and in the removal of snow and ice. Fourteen towns are listed, the track mileage ranging from 0.85 to 22.11 and the taxes from $271 to $7,064. The commission will hear the petition on Dec. 4 at Boston. This is the first case of its kind to come before the board.

Legitimacy of Pay Roll and Business.—W. D. B. Dodson, executive secretary of the Portland (Ore.) Chamber of Commerce, addressed members of that body recently on "Legitimacy of Pay Roll and Business." The chamber is endeavoring to show that a part of the depression in the Pacific Northwest is due to lack of support of the community to legitimate business. In concluding his remarks Mr. Dodson said that the Chamber of Commerce was going to try to change public sentiment to an appreciation of the necessity of getting the payroll firmly fixed and not allowing irresponsible elements to come in and attack it with impunity. In this work the members of the Chamber of Commerce and the community as a whole must co-operate, and the success in the plan of encouraging the upbuilding of the payroll depended very largely upon the response to the appeal. The speech was considered very significant, coming as it did on top of the granting of the open shop on the river front at Portland, where the members of the longshoremen's union, when their strike fell through, were compelled to return to work on the same basis as paid by other coast cities and with an open shop, something new to Portland for the first time in many years.

PROGRAM OF ASSOCIATION MEETING

Safety First Federation of America

The convention of the Safety First Federation of America in Baltimore, Md., on Dec. 7, 8 and 9, referred to previously in the ELECTRIC RAILWAY JOURNAL, will be the second annual gathering of the federation, and will be under the auspices of the Safety First Society of Baltimore with headquarters in the Hotel Emerson. Darwin P. Kingsley, president of the federation, will preside at all sessions. The afternoon session on Dec. 7 is to be devoted to street traffic and will be as follows:

Report of the street traffic committee on the standard code of traffic regulations, headlight glare and code of signals. This report will be presented by John Gillespie, chairman of the committee, who is ex-commissioner of police of Detroit, Mich.

Address, "The Necessity of Examining and Licensing All Operators of Motor Vehicles," by Arthur Woods, commissioner of police of New York.

Address, "Baltimore's Recent Contribution to Street Traffic Regulation," by Robert D. Carter, marshal of police of Baltimore.

Address, "The Work of the Traffic Court," by Joseph Sabatch, judge of the superior court of Cook County, Chicago, Ill.

Address, "The Necessity of Distinct Examination for Operators of Different Types of Cars," by E. Austin Gaughman, automobile commissioner of Baltimore, Md.

Address, "Co-operation on Behalf of Automobile Manufacturers," by J. Walter Drake, chairman of the safety first committee of the National Automobile Chamber of Commerce.

Address, "The Pedestrian's View of Traffic," by H. W. Rowe, president of the American Automobile Association.

The morning of Dec. 8 will be devoted to discussions of the trespass problem and the question of reducing accidents upon the right-of-way of railroads. The afternoon session on Dec. 8 will be given over to a discussion of fire prevention.

A number of miscellaneous matters will be considered at the closing session on Dec. 9. At that session, C. Loomis Allen, Syracuse, N. Y., ex-president of the American Electric Railway Association, will report for the committee on city and interurban railways and William A. House, president of the United Railways & Electric Company, Baltimore, will discuss "Safety First Movement from the Street Railway Point of View."

Financial and Corporate

UTILITY ISSUES AS COLLATERAL

Utility Bonds Constitute More Than One Quarter of Number of Issues Deposited Against British Loan

The list of securities serving as collateral for the recent $300,000,000 of 5½ per cent British government gold loan covers two distinct groups of securities aggregating in value $180,000,000 each. One group is made up of bonds and other obligations of the governments of Australia, South Africa, New Zealand, Argentina, Chile, Cuba, Japan, Egypt and India, together with $25,000,000 of British railroad securities. The other group consists of Canadian government bonds and at least $100,000,000 of American securities.

The American securities include 127 stock issues and 615 bond issues. The stock group is divided into fifty-four steam railroad issues, sixteen utility issues and fifty-seven industrial and miscellaneous issues. American Light & Traction preferred, California Railway & Power prior preference, Detroit United Railway and Twin City Rapid Transit common and preferred are among the stocks deposited from abroad. The bond group comprises 437 steam railroad issues, 120 public utility issues (including fifty-two electric railway issues) and fifty-eight industrial and miscellaneous issues. The electric railway bonds follow:

Albany Ry. general M. 5s, 1947.
American Cities 8-year 5-6% col. tr. 1919.
American Pwr. & Lt. 10-yr. 6s, 1921.
Auburn & Syracuse Elec. RR. 1st & ref. M. 5s, 1942.
Broadway & Seventh Ave. RR. 1st cons. M. 5s, 1943.
Brooklyn Rapid Transit—
  Secured 5% notes, 1918.
  1st & ref. M. 4s, 2002.
  5s, 1945.
Brooklyn Union Elev. 1st M. 5s, 1950.
Central Illinois Pub. Serv. 1st & ref. M. 5s, 1952.
Chicago City Ry. 1st M. 5s, 1927.
Chicago Rys. 1st M. 5s. 1927.
Connecticut Ry. & Lt. 1st ref. M. 4½s, 1951.
Dallas Electric 1st. M. collat. tr. 5s, 1922.
Detroit United Rys. 1st cons. 4½s, 1932.
Duluth Street Ry. 1st M. 5s, 4½s, 1932.
  Gen. M. 5s. 1930.
Eastern Penna. Rys. 1st M. 5s, 1936.
Eastern Power & Light Corp. convert. 5s, 1918.
Federal Lt. & Trac. 1st lien s. f. 5s, 1942.
Georgia Lt. Pow. & Rys. 1st lien 5s, 1941.
Hudson & Manhattan RR. 1st lien & ref. M. 5s, "A," 1957.
Indiana Ry. 1st M. 5s, 1930.
Int.-Met. collat. tr. 4½s, 1956.
Interborough Rapid Transit—
  1st M. 5s, 1966.
  1st M. 5s, 1966, reg.
Kings County Elev. RR. 1st M. 4s, 1949.
Lexington Ave. & Pav. Ferry 1st M. 5s, 1993.
Manhattan Ry. cons. 4s, 1990.
Lynn & Boston RR. 1st M. 5s, 1924.
Milwaukee Elec. Ry. & Lt. cons. M. 5s, 1926.
Minneapolis St. Ry. & St. Paul City Ry. cons. M. 5s, 1928.
Nashville Ry. & Lt. ref. & ext. 5s, 1958.
Nassau Electric RR. 1st cons. M. 4s, 1951.
New Orleans Ry. & Lt. gen. 4½s, 1935.
Newport News & Hampton Ry., Gas & Electric 1st & ref. M. 5s, 1944.
Northwestern Elev. Ry. 1st M. 5s, 1941.
Pennsylvania & Mahoning Valley Ry. 1st & ref. M. 5s, 1922.
Portland Ry. 1st & ref. M. 5s, 1930.
Portland Ry., Lt. & Pwr. 1st ref. 5s, 1942, series A.
Puget Sound Trac., Lt. & Pow. 6s, 1919.
Rochester Ry. M. 5s, 1930.
St. Louis, Springfield & Peoria RR. 1st & ref. 5s, 1939.
St. Paul City Ry. cons. cable 5s, 1937.
San Joaquin Lt. & Pwr. Corp. 1st & ref. 5s, 1950, "B."
Spokane & Inland Empire RR. 1st ref. M. 5s, 1926.
Third Ave. RR. 1st M. 5s, 1937.
  1st ref. 4s, 1960.
  Adjust. M. 5s, 1960.
Tri-City Ry. & Lt. 1st ref. 5s, 1930.
United Light & Rys. 1st & ref. M. 5s, 1932.
United Ry. & Elec. 1st cons. 4s, 1949.
United Rys. Investment 1st lien collat. tr. 5s, 1926.
Washington Wtr. Pwr. 1st ref. M. 5s, 1939.

TRUST COMPANY WANTS BETTER TERMS

The Mercantile Trust & Deposit Company, Baltimore, Md., has addressed the holders of the 4 per cent gold bonds of the United Railroads, San Francisco, Cal., in part as follows:

"As owners of and the representatives of owners of a substantial amount of bonds of the above issue, we have studied the proposed plan of reorganization of the United Railroads of San Francisco.

"It is our opinion, after a careful examination of the financial condition of the company, that a reorganization can be effected which, while fair and just to the holders of the junior securities, insures to the holders of the 4 per cent bonds a more advantageous settlement than that proposed in the present plan. To effect such a reorganization will require concerted action on the part of a large number of holders.

"We are advised that only $6,000,000 of the total of $23,000,000 of bonds have been deposited as consenting to the proposed plan.

"If the holders of sufficient bonds co-operate with us, arrangements will at once be made looking to the appointment by the holders of a committee who will actively endeavor to obtain more advantageous terms for these bonds in the reorganization."

ANNUAL REPORT

Eastern Pennsylvania Railways

The comparative income statement of the Eastern Pennsylvania Railways, Pottsville, Pa., for the years ended June 30, 1915 and 1916, follows:

	1916		1915	
	Amount	Per Cent	Amount	Per Cent
Gross earnings	$901,490	100.0	$825,455	100.0
Operating expenses	529,195	58.7	469,083	56.8
Net earnings from operation	$372,295	41.3	$356,372	43.2
Taxes	20,452	2.3	17,487	2.1
Net earnings from taxes	$351,843	39.0	$338,885	41.1
Deductions—underlying companies	47,453	5.3	47,132	5.8
Balance	$304,390	33.7	$291,753	35.3
Deductions — Eastern Pennsylvania Railways	184,682	20.4	180,651	21.9
Balance	$119,708	13.3	$111,102	13.4

During the last year the gross earnings increased $76,034 or 9.2 per cent and totaled the largest in the company's history. Of this increase only $9,942 was derived from the purchase of new properties operated only a few months. The operating expenses, however, increased $60,111 or 12.8 per cent, so that the increase in net earnings was $15 923, an increase of 4.5 per cent. The increase in operating expenses was chiefly caused by the cost of more power to take care of increased business, a larger expenditure for replacements and renewals, workmen's compensation expenses, increased wages and increased cost of materials and supplies. Taxes increased $2,965 or 16.9 per cent. The balance available for depreciation, amortization and dividends, however, showed an increase of $8,605 or 7.7 per cent after all charges were paid.

MAJORITY STOCKHOLDERS GUARDIANS OF MINORITY INTERESTS

If a decision just handed down by Justice Giegerich of the New York Supreme Court is not reversed, the Delaware, Lackawanna & Western Railroad will have to give up the lease of a little railroad which it absorbed in 1911. This road is the Syracuse, Binghamton & New York Railroad, which has been plying between the two first named cities since it was organized in October, 1850. The road is only eighty-one miles long. It had been paying for many years around 25 per cent dividends on its capitalization of $2,500,000, except in 1912, when it paid 37½ per cent.

Prior to Aug. 19, 1907, the Delaware, Lackawanna & Western Railroad owned 19,389 shares of this stock, and the Public Service Commission of the Second District gave it permission to gather in the remainder of tre 25,000 shares if it could. The road could get hold of only 21,301 of the shares. On Dec. 6, 1911, the board of directors ratified a lease of the little railway to the Lackawanna company. One of the provisions was that the rate of interest paid to the stockholders of the small road would be 12 per cent, to be paid quarterly, beginning Feb. 1, 1913.

The small group of minority stockholders protested against the lease, and suit was begun for an annulment and an accounting. In his opinion Justice Giegerich pointed out that practically every provision of the lease was in favor of the big line. "The case presented," continued the court, "seems so plainly to be one where all the risk of loss is thrown upon the lessor and all chance of gain given to the lessee, that the intervention of the court is required in the interest of the minority stockholders."

Counsel for the complainants explain that one of the important points covered by the court was in deciding that majority stockholders are in a measure the guardians of the interests of the minority stockholders. Any action taken by the majority to the detriment of the minority is, therefore, in the nature of a breach of trust.

Elkins (W. Va.) Electric Railway — J. C. McSpadden, Rockwood, Pa., president of the Elkins Electric Railway, is reported to have sold the road to M. H. Frank, a junk dealer of Pittsburgh. The sale included four cars, all the rails, machinery, copper and other material. Mr. McSpadden retains the franchise within the city and certain real estate of the company.

Fort Dodge, Des Moines & Southern Railway, Boone, Iowa.—On Nov. 1 the Fort Dodge, Des Moines & Southern Railway paid a dividend of 1½ per cent on its common stock. A like amount was paid on Aug. 1. The company has paid dividends on the preferred stock since February, 1916, 1¾ per cent each quarter.

Georgia Railway & Power Company, Atlanta, Ga.—All the interests of the Franklin Light & Power Company, the Broad River Power Company and the J. B. McCrary Company, Hartwell, Ga., have been acquired by the Georgia Railway & Power Company.

Interborough Rapid Transit Company, New York, N. Y.—The last of $160,585,000 of first and refunding mortgage 5 per cent bonds issued by the Interborough Rapid Transit Company to finance the improvement and construction program worked out with the city have been sold, and it is expected that the underwriting syndicate, which was organized four and one-half years ago to handle the issue, will shortly be dissolved. Prior to its inception the largest single issue of corporate securities attempted in this country was $100,000,000. When the syndicate was formed, in April, 1912, an international syndicate with 280 participants was assembled, the members of which will shortly be relieved of their commitments. A selling syndicate was formed by Lee, Higginson & Company, Harris, Forbes & Company and Kissel, Kinnicutt & Company, which recently took over from the original syndicate $24,458,000 of the bonds, which they offered at 98¾. At the same time they took an option on $12,229,000 of the bonds remaining, which they will now exercise. J. P. Morgan & Company have called upon all of the participants to return any unsold bonds which they may have, so that the entire transaction may be wound up.

Northern Ohio Electric Corporation, Akron, Ohio.—The syndicate that offered the preferred and common stock of the Northern Ohio Electric Corporation has been closed and applications have been made to list the stock on the Cleveland, Cincinnati, Columbus and Louisville Stock Exchanges. The Northern Ohio Electric Corporation controls the Northern Ohio Traction & Light Company through stock ownership.

Pottsville (Pa.) Union Traction Company.—The Pottsville Union Traction Company has notified the Pennsylvania Public Service Commission that it proposes to issue additional bonds to the amount of $150,000 to the Eastern Pennsylvania Railways in payment of funds advanced by that company to the Pottsville company and advanced in turn to the Pottsville & St. Clair Electric Railway for use in building the line of the latter company. The Pottsville & St. Clair Electric Railway proposes to issue $150,000 of bonds to be delivered to the Pottsville Union Traction Company in repayment of funds advanced by that company and expended in constructing the road of the Pottsville & St. Clair Electric Railway.

Seattle (Wash.) Municipal Railway.—According to information supplied by the Public Utilities Department of Seattle, Wash., of which A. L. Valentine is superintendent, Seattle's two municipal car lines were operated during the month of October at a loss of $1,985. Division A showed an operating loss of $218, with an interest charge of $1,593, making the total loss for that division $1,812. The revenues of this line for the month amounted to $1,701. The cost of operation was $1,920. Division C, known as Lake Burien line, was operated at a loss of $172. The revenues of the line were $2,264, and the cost of operation $2,436. The city began the operation of these two car lines June 1, 1914, and the loss each month has averaged more than $2,000. As no provision is made in the annual tax budget for these losses, they become a direct charge against the general fund, the lighting fund sharing in the loss to some extent by furnishing electricity at a rate below the actual cost of the delivery of current.

DIVIDENDS DECLARED

American Railways, Philadelphia, Pa., $1, common.

Central Mississippi Valley Electric Properties, Keokuk, Iowa, quarterly, 1½ per cent, preferred.

Norfolk Railway & Light Company, Norfolk, Va., 75 cents.

Northern Texas Electric Company, Fort Worth, Tex., quarterly, 1 per cent, common.

United Light & Railways Company, Grand Rapids, Mich., quarterly, 1½ per cent, first preferred; quarterly, 1 per cent, common.

ELECTRIC RAILWAY MONTHLY EARNINGS

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
BATON ROUGE (LA.) ELECTRIC COMPANY					
1m., Sept., '16	$17,285	*$8,352	$8.933	$3,527	$5,406
1 " " '15	16,446	*8,686	7,760	2,192	5,568
12 " " '16	208,123	*103,899	104,224	38,958	65,266
12 " " '15	185,469	*109,269	76,200	25,527	50,673
BROCKTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.					
1m., Sept., '16	$12,496	*$9,569	$2,927	$1,102	$1,825
1 " " '15	12,040	*8,537	3,503	1,103	2,400
12 " " '16	120,778	*104,790	15,988	13,240	2,748
12 " " '15	115,735	*98,381	17,354	13,600	3,754
CAPE BRETON ELECTRIC COMPANY, LTD., SYDNEY, N. S.					
1m., Sept., '16	$33.804	*$18,190	$15,614	$6,568	$9,046
1 " " '15	33,639	*18,184	15,455	6,594	8,861
12 " " '16	385,443	*225.937	159.506	78,507	80,999
12 " " '15	344,372	*207,270	137,102	79,196	57,906
COLUMBUS (GA.) ELECTRIC COMPANY					
1m., Sept., '16	$77,658	*$30,491	$47,167	$28,630	$18,537
1 " " '15	61,827	*28,479	33,348	28,679	4,669
12 " " '16	829,894	*341,144	488,750	344,041	144,709
12 " " '15	703,586	*324,010	379,576	344,888	34,688
DALLAS (TEX.) ELECTRIC COMPANY					
1m., Sept., '16	$157,977	*$95,551	$62,426	$36,538	‡$28,031
1 " " '15	148,153	*92,680	55,473	33.459	22,014
12 " " '16	1,913,020	*1,184,003	729.017	433,441	‡314,918
12 " " '15	1,880,820	*1,112,888	767,932	400,844	367,088
EASTERN TEXAS ELECTRIC COMPANY, BEAUMONT, TEX.					
1m., Sept., '16	$72,387	*$37,777	$34,610	$8,753	$25,857
1 " " '15	68.914	*33,426	35,488	8,710	26,778
12 " " '16	817,376	*432,879	384,497	106,292	278,205
12 " " '15	679,441	*379,186	300,255	104,940	195,315
EL PASO (TEX.) ELECTRIC COMPANY					
1m., Sept., '16	$92,264	*$60,949	$31,315	$5,120	$26,195
1 " " '15	78,367	*42,044	36,323	4,197	32,126
12 " " '16	1,068,260	*622,131	446,129	55,807	390,322
12 " " '15	971,204	*520,935	450,269	50,355	399,914
GALVESTON-HOUSTON ELECTRIC COMPANY, GALVESTON TEX.					
1m., Sept., '16	$159,844	*$102,747	$57,097	$36,587	$20,510
1 " " '15	163,018	*90.393	72,625	36.042	36.583
12 " " '16	1,932,169	*1,228,006	704,163	437,883	266,280
12 " " '15	2,007,724	*1,202,492	805,232	433,046	372,186
HOUGHTON COUNTY TRACTION COMPANY, HOUGHTON, MICH.					
1m., Sept., '16	$26,730	*$15,175	$11,555	$5,240	$6,315
1 " " '15	23,388	*11,799	11,590	5,523	6.067
12 " " '16	317,341	*179,209	138,132	64,760	73,372
12 " " '15	266,195	*160,828	105,367	66,764	38.603
JACKSONVILLE (FLA.) TRACTION COMPANY					
1m., Sept., '16	$50,147	*$35,316	$14,831	$15,400	†$569
1 " " '15	46,942	*31,302	15.640	14,685	955
12 " " '16	621,079	*423.758	197,321	181,606	15,715
12 " " '15	623,129	*435,080	188,049	172,502	15,547
NORTHERN TEXAS ELECTRIC COMPANY, FORT WORTH, TEX.					
1m., Sept., '16	$161,044	*$94,256	$66,788	$29,416	$37,372
1 " " '15	142,737	*86,351	56,386	27,675	28,711
12 " " '16	1,862,691	*1,139,551	723,140	343,587	379,553
12 " " '15	1,733,222	*1,035,929	697,293	328,969	368,324
PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.					
1m., Sept., '16	$690,475	*$412.714	$277,761	$184,760	$93,001
1 " " '15	609.782	*387,576	222,206	182.823	39,383
12 " " '16	7,855,965	*5,013,664	2.842,301	2,206,485	635,816
12 " " '15	7,690,014	*4,775,166	2,914,848	2,165,431	749,417
SAVANNAH (GA.) ELECTRIC COMPANY					
1m., Sept., '16	$70,466	*$48.070	$22,396	$23,570	†$1,174
1 " " '15	64,017	*42,693	21,324	23,126	1,802
12 " " '16	802,270	*540,849	261,421	280,956	19,535
12 " " '15	799,977	*520,752	279,225	278,357	868
TAMPA (FLA) ELECTRIC COMPANY					
1m., Sept., '16	$79,285	*$43,303	$35,982	$4,255	$31,727
1 " " '15	78,755	*39,265	39,490	4,370	35,120
12 " " '16	966.673	*526.254	440.419	52,217	398,202
12 " " '15	976,210	*498,553	477,657	52,751	424,906

*Includes taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

TOILETS ON INTERURBANS OPPOSED

Conference on Subject Before Pennsylvania Commission Brings Out Large Attendance in Opposition

At a conference at the State Capitol in Harrisburg, Pa., on Nov. 17, between Public Service Commissioner John S. Rilling, Herbert F. Snow, chief engineer of the commission, and representatives of electric railways in Pennsylvania, a proposed general order compelling the installation of toilet facilities on interurban electric railway cars was opposed by the railroad representatives present. Commissioner Rilling explained that complaints had been filed against several interurban lines because no toilet facilities were afforded the passengers. He stated that the conference was called merely to obtain the viewpoint of the railways and not with an idea of deciding off-hand what shall be done in the matter.

C. L. S. Tingley, representing the Southern Pennsylvania Traction Company, the Scranton Railway, the Altoona & Logan Valley Electric Railway and the Pennsylvania Street Railway Association, summed up the attitude of the association in the first address of the afternoon. Mr. Tingley pointed out that the Pennsylvania Street Railway Association included more than 60 per cent of the companies operating in Pennsylvania, controlling more than 90 per cent of the interurban as well as urban lines in the State. He declared that such a proposed general order was opposed because most of the interurban cars were run on urban as well as interurban lines; that the use of toilet facilities would be impracticable for much of the distance over which the cars operated; that the installation of toilets in the front and rear of cars would narrow the aisles, retard the loading and unloading of passengers and slow up traffic; that such facilities would work a financial hardship on all companies; that electric railway toilets were seldom used; that townships and boroughs would not tolerate the indiscriminate placing of sewage on their streets and highways, and that such sewage disposal would be a menace to public health and decency. In short, toilets on electric railway cars would be a menace to the general public and a source of great annoyance to the traveling public rather than a convenience.

Mr. Tingley ended with a plea that no general order be issued, but that each case of complaint be dealt with separately by the commission. He also pointed out that the installation of toilet facilities would be almost an engineering impossibility on most cars, because sections of the floor of the car covered intricate machinery used in operation. Mr. Tingley said that he believed most companies would be glad to provide facilities at terminal points, but he opposed comfort stations at points where janitors were not employed.

T. B. Donnelly, claim agent of the West Penn Railways, declared that the toilets on that company's cars were not used more than once a day. The company kept the doors of the toilets locked to prevent their use at points where such usage would be objectionable and to offstay their misuse. Such misuse he declared to be quite common.

Charles H. Bergner, representing the Valley Railways, operating between Harrisburg and points in Cumberland and Perry Counties, pointed out that struggling companies compelled to reconstruct their rolling stock, would be forced to raise the rates of fare to meet the increased capital invested and would then come into competition with the unregulated jitneys operating throughout the State.

W. I. Schaffer, representing the Philadelphia & Westchester Traction Company, pleaded for individual orders covering individual cases as opposed to any general order.

C. B. Fairchild, Jr., executive assistant of the Philadelphia Rapid Transit Company, pointed out how toilets in the cars would hamper loading and unloading, and slow up traffic during the rush hours when the interurban cars were in the city. He pleaded for the greatest convenience for the greatest number.

Ralph Baker, of the Mahoning & Shenango Railway & Light Company, declared that electric railway toilets would be distinctly unsanitary from the viewpoint of public health.

J. L. Adams, general manager of the Philadelphia & Western Railway, stated that after an investigation covering three months' time, it was found that the toilets in the cars on the lines of that company were used only once in 1562 miles, or about once in every five days.

H. Bingaman, of the Pittsburgh Railways, said that less than 10 per cent of all interurban travel was of the long haul variety, and therefore more than 90 per cent of the traveling public would seldom if ever want such facilities.

J. H. McClure, general superintendent of the Citizens' Traction Company, Oil City, declared that never in the history of the company had there been a complaint because of lack of toilet facilities.

R. D. Sefton, general manager of the Chambersburg, Greencastle & Waynesboro Street Railway, said his company has not received a complaint since it began operations in 1903.

C. A. Emerson, Jr., chief sanitary engineer of the State Health Department, declared that the dumping of sewage on watersheds of the State streams was prohibited by law because often such indiscriminate sewage disposal lead to epidemics of such diseases as typhoid. He stated that no container had yet been invented which was not offensive, especially in the summer time.

Among the railway representatives who attended, other than those already mentioned, were: C. H. Bishop, of the Valley Railways; A. W. Day, of the North Branch Transit Company; Gordon Campbell, of the York Railways; H. H. Aitkens, of the Philadelphia & West Chester Traction Company; R. R. Hull, of the Conestoga Traction, Lancaster; Charles L. Baily, Jr., of the Harrisburg Railways; I. W. Welsh, of the Pittsburgh Railways; E. W. Samuels, of the Shamokin & Mt. Carmel Transit Company; W. R. Adair, of the Pittsburgh & Butler Railway; L. H. Palmer, of the Eastern Pennsylvania Railways, and H. M. Stine, secretary of the Pennsylvania Street Railway Association.

PORTLAND JITNEY ORDINANCE IN EFFECT

Fifty-five jitney drivers were arrested in Portland, Ore., on Nov. 16, charged with failing to take out franchises as prescribed in an ordinance which went into effect on Nov. 15 at midnight. Their automobiles were held as security, and lined the streets for blocks in the neighborhood of the Police Court. The drivers claim the ordinance is prohibitory and plan to fight it.

At a meeting of the City Council on Nov. 15 the jitney franchise ordinance, which the men arrested on Nov. 16 were charged with violating, was approved by a majority vote of the Council, and Mayor Albee was instructed to clamp down the lid on all jitney operators who refused to abide by the regulation. All the members of the Council voted for the action, except Commissioner Daly.

The Chamber of Commerce recently went on record in favor of placing jitneys on the same basis as street railway transportation, and the Chamber adopted a resolution commending the City Council for its position that any public utility using or proposing to use streets for revenue purposes shall be required to operate under franchises which impose responsibilities and service requirement equal to those on other or established utilities enjoying like privileges on public streets. The resolution also urged that the police power of the city be used to prohibit the use of the city streets by carriers which attempt to operate in defiance of ordinances regulating franchises.

The regulations embodied in the franchise approved by the Council provide for service into all well-settled districts; payment of bridge tolls, granting of transfers and furnishing of bond of $400 for each bus in service for protection of persons suffering personal injuries.

Before final action was taken on the ordinance, C. W. Hodson, representing the Chamber of Commerce and business men of the city, urged the Council to afford some measure of relief to the Portland Railway, Light & Power Company from unfair competition. A. I. Moulton, the attorney representing the jitney interests, said: "It will be impossible for the jitney men to continue in business under the regulation ordered. We intend to fight the enforcement of the order of the Council. Jitneys cannot survive on the routes outlined in the ordinance, and they will not be able to provide a transfer system. The franchise ordinance was framed deliberately so that we could not accept it."

Judge Arthur Langguth in the municipal court on Nov. 16 upheld the city ordinance requiring that jitneys shall operate under franchise, when he found guilty W. R. Funk, charged with having violated the ordinance. It was a test case and notice of appeal was given. The other drivers, however, it is reported, agreed not to operate further as jitneys pending determination of the Funk case in the higher court. Some of them declared they would operate their cars as taxicabs.

Mr. Moulton, the attorney for the jitney union, states the contention of the jitney men is that they have paid their license to Dec. 31, and should be permitted to operate under the license, as the license ordinance has not been repealed nor has the Council passed an ordinance to refund license money for the unexpired term. City Attorney Stadter holds that the franchise ordinance for jitneys was passed on July 19 to take effect on Nov. 15, and that the franchise ordinance replaced the old license ordinance.

DES MOINES TO START SAFETY-FIRST WORK

Claim Agent of Des Moines City Railway Outlines Safety Campaign to Start Jan. 1

Dan M. Finch is mapping out the work for the safety first bureau which will be established by the Des Moines (Iowa) City Railway on Jan. 1, 1917. Mr. Finch has been claim agent for the Des Moines street railway system for more than thirty years, and is using his statistics on street accidents as data on which to work for safety first. In discussing the establishment of the new bureau with the representative of the ELECTRIC RAILWAY JOURNAL in Des Moines, Mr. Finch said:

"Our plan is to start on Jan. 1 with educational meetings of our men in all the different departments of the service. Every city railway employee will be instructed along lines best fitted to bring out a maximum of safety for the public.

"One of the most important features of the general educational work with the public will be the production of 1000 ft. of moving picture film to show how accidents happen and how they may be prevented. These will be for display in the theatres and schools of Des Moines and also in cities and towns of Iowa outside of Des Moines whether or not they have street railway systems.

"We are interested in educating the public outside of Des Moines because we find that 20 per cent of all of our accidents involve automobiles from outside of Des Moines. Our records show that we have as much or more grief with out-of-town auto drivers as with our home people. Of recent years we have experienced an increase in automobile accidents with a decrease at the same time in every other class of accidents.

"The moving pictures will be supplemented by instructive lectures to all of the school children of the city by representatives of this department. We shall at the same time appeal to the general public through safety first advertising copy in the columns of the daily newspapers.

"We shall also work for closer co-operation with the city government to bring about a more rigid enforcement of the city traffic ordinances. We shall seek a revision of some ordinances for the sake of uniformity and greater safety to the public. Pedestrians, and especially 'jay-walkers,' give us as much trouble as do automobiles, and we wish to co-operate with the city to suppress the 'jay-walking' evil.

"The city has recently established a traffic bureau with one head, and we are now co-operating with that bureau to secure uniformity of signals at busy corners and other uniform regulations which will tend to decrease confusion at rush hours in the down-town district. This work is to be augmented under the new plans of the safety bureau. Other features of our campaign will be the use of advertising placards throughout the city and the general dissemination of the safety first idea in every possible way. The work will be under the direction of Judge W. H. McHenry, who becomes general counsel for the Des Moines City Railway on Jan. 1, and who will have supervision of the accident and claim department as well."

TRENTON FARE CASE ARGUED

Argument has been heard by the Supreme Court of New Jersey in the case in which the Trenton & Mercer County Traction Corporation, Trenton, is seeking to sustain its right to discontinue the sale of strip tickets. The company, under a writ of certiorari, brought up for review the order of the Board of Public Utility Commissioners of the State requiring the company not to suspend the six-for-a-quarter tickets. The company contended that the rights granted to the company and its predecessors constituted inviolable contracts by which the rate of fare for each passenger more than five years of age was made 5 cents; that the contracts were impaired contrary to the constitution by the passage of the public utility act and the assumption of power by the utility board; that the proposed ticket withdrawal was not an increase or an alteration of an existing classification, as held by the board, and that the order of the board would have the effect of depriving the company of property without due process of law. The city contended that the Board of Public Utility Commissioners has jurisdiction; that the ordinance requiring the sale of tickets superseded previous contracts, if any existed; that the ordinance of Oct. 22, 1909, compelling the sale of tickets, was valid as an ordinance, if not as a contract; that the company's valuation of its property was excessive; that the company has no right to allowance for franchise value; that the present earnings are ample to provide a reasonable return on the value of property and that the discontinuance of tickets is an increase of fare.

SAFETY DISCUSSED AT PENNSYLVANIA CONFERENCE

At the fourth annual Pennsylvania Welfare and Efficiency Conference held at the State Capitol in Harrisburg on Nov. 21, 22 and 23 the accident problem on electric railways was discussed by Samuel B. Hare, claim agent of the Altoona & Logan Valley Electric Railway, Altoona, Pa., and by P. J. McGrath, financial secretary of Division No. 85 of the Amalgamated Association at Pittsburgh.

Mr. Hare declared that most accidents on electric railways were preventable, and were caused by carelessness, bad habits and thoughtlessness. He declared that the company's part in promoting safety was in selecting good men as employees and then retaining them in the service. All employees should be instructed in safety measures by a competent official. An employee should not be blamed for an accident unless the accident was caused by culpable carelessness. Mr. Hare said that the public should be cautioned against carelessness. Many people were unjustly prejudiced against the railways and would not take advice for their own safety. Promptness in settling grievances between the company and the public would go a long way toward improving the attitude of the public toward the corporation. Statistics showed that the number of accidents since the prepayment type of car was used was only one in every 444,380 passengers hauled, while the ratio was one in every 137,000 hauled on the old-type cars. Mr. Hare said that the public demanded protection from the railways, but was loath to protect itself.

A feature of Mr. Hare's address was his criticism of the State in granting automobile licenses to people without the necessary qualifications. He pointed out that many accidents were the result of incompetent driving of automobiles. Thousands of persons were licensed by the State to run autos that no self-respecting railway would think of employing as motormen. He urged the enactment of a law to prohibit from obtaining licenses those physically or mentally unfit to operate cars. Mr. Hare ended his address with a plea for the teaching of safety first in all of the public schools.

Mr. McGrath said that all street railway employees were interested in the public welfare and tried in every way possible to avoid injuring pedestrian or passenger. Their biggest difficulty lay in the fact that people would not assist them by looking out for their own safety. Mr. McGrath urged, as a measure of safety, that the railways see to it that the men in their employ obtained periods of rest similar to those deemed by employers in other lines to be essential to the highest efficiency.

NEW JERSEY JITNEY LAW UPHELD

The Supreme Court of New Jersey has rendered a decision upholding the constitutionality of the Kates law to regulate the operation of jitneys in municipalities. This measure was passed last winter by the New Jersey Legislature over the protest of the jitney men and their friends that it was a move to put the jitneys out of business. Objection was made particularly to a bonding feature and the payment of part of the earnings of each jitney to the municipality in which it operated, but these provisions were incorporated into the law.

The case just decided was a test suit brought by Joseph West and other jitney owners against the city of Asbury Park. The Supreme Court held that the power of the Legislature to authorize municipal corporations to regulate the use of streets by vehicles even to the extent of excluding vehicular traffic is established in New Jersey. The court also ruled against the contention of the jitney men that the act deprived them of the equal protection under the law. It held that the city was within its rights under the law in prescribing an ordinance regulating the operation of jitneys.

A summary of the provisions of the bill was published in the issue of the ELECTRIC RAILWAY JOURNAL of April 1, 1916, page 670.

New Cars and New Fare System in Bangor.—The Bangor Railway & Electric Company, Bangor, Me., has placed in operation the first of three center-entrance cars of the Laconia Car Company, mounted on Philadelphia Holding Company radial trucks. The railway has also announced its decision to adopt the Rooke system of fare collection. The company operates 65 miles of electric railway in Bangor and vicinity, including among others the towns of Brewer, Old Town, Orono, Milford, Kenduskeag and Corinth.

St. Louis Transfers Burdensome.—In an editorial contained in the last issue of the *United Railways Bulletin*, signed by Richard McCulloch, president of the United Railways, St. Louis, Mo., he intimated it may be necessary to withdraw some of the transfer privileges because of an unequal expansion of the use of transfers in proportion to the increase of revenue. Mr. McCulloch declared that street railway costs were soaring, and that comparing the year 1915 with the year 1901 the total of revenue passengers increased 75 per cent, while free transfer passengers increased 171 per cent. City Counsellor Daues says the present transfer privileges were guaranteed to the citizens of St. Louis in a Circuit Court decision several years ago.

New London Folders.—The ELECTRIC RAILWAY JOURNAL has just received through the courtesy of the Underground Electric Railways of London, Eng., four more recent specimens of posters similar to the ones which this paper displayed in the interest of the railway at the recent convention of the American Electric Railway Association in Atlantic City. All are the design of E. A. Cox. At the bottom of each poster is a legend such as "Edgeware by Tram," "Hampton Court by Tram," "Watford" and "Kingston by Tram." Other than the design this is the only printing they contain. The affiliated company, the General Omnibus Company, has issued a four-page folder 10 in. by 6¼ in. entitled "Ten Little Nigger Boys," in the interest of safety first for children. The folder is in black and red and is illustrated.

Springfield Trolley Mail Pay Increased.—The Springfield (Mass.) Street Railway is to receive 4 cents a mile from Nov. 20 for carrying mail between Springfield and East Longmeadow. This is an increase of 1 cent a mile over the former rate. Improved service will be assured through the co-operation of the company with the postal authorities. Until a few weeks ago East Longmeadow enjoyed two mails a day, but changes in the local steam railroad timetable reduced the service to one mail a day. Numerous complaints were presented to Postmaster Costello of Springfield, who negotiated with the street railway to dispatch a mail-carrying car from Springfield at 11 a. m. at the 4-cent rate. The first mail will be carried by the steam railroad, but the second mail will be followed by a return trolley mail service from East Longmeadow to Springfield at mid-day. It is stated that the increased rate will yield the Springfield company $3,000 a year compared with a former income from mail carriage of about $2,200.

Personal Mention

B. P. Newton, formerly storekeeper of the Cleveland, Southwestern & Columbus Railway, Elyria, Ohio, has been promoted to the position of traveling auditor of the company.

W. S. Avery, formerly clerk in the auditor's office of the Cleveland, Southwestern & Columbus Railway, Elyria, Ohio, has been promoted to the position of storekeeper of the company.

George Alexander, formerly chief engineer of the Atlantic Shore Railway's generating station at Kittery Point, Me., has been appointed chief engineer of the Worcester (Mass.) Electric Light Company.

S. H. Dailey, Binghamton, N. Y., has been appointed general manager of the Kentucky Traction & Terminal Company, operating the Lexington, Ky., city lines and the interurban lines out of that city. This is a new position with the company. Mr. Dailey's appointment will not in any way affect the present organization.

Joseph Stewart, formerly general and joint agent at Pueblo, Col., for the Denver & Rio Grande Railroad, the Chicago, Rock Island & Pacific Railroad the Santa Fé Railroad and the Colorado & Southern Railroad, has been appointed general manager of the Grand Junction Electric, Gas & Manufacturing Company and the Grand River Valley Railway, with headquarters at Grand Junction.

G. K. Jeffries, general superintendent of the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., was operated on for appendicitis on Nov. 22. The attack was very sudden and canceled his plans to join the special car party to the Toledo convention of the Central Electric Railway Association on Nov. 24. Word was received at the convention Thursday afternoon that he was doing well and that no complications were expected.

Simon Bamberger, formerly president of the Salt Lake & Ogden Railroad, Salt Lake City, Utah, was elected Governor of the State on the Democratic State ticket at the recent election. He is the first Democrat and the first non-Mormon to be elected Governor of Utah. Mr. Bamberger has for many years been prominent in business and civic affairs in Utah. He served two terms on the Salt Lake Board of Education and four years as Sate Senator. An extended sketch of Mr. Bamberger was published in the second issue of the ELECTRIC RAILWAY JOURNAL Convention Daily at the recent convention of the American Electric Railway Association in Atlantic City.

John Leisenring, signal engineer of the Illinois Traction System, Peoria, Ill., has just been appointed by the American Railway Engineering Association and the Railway Signal Association, two steam railroad organizations, a member of the joint signal committee of these associations. This joint committee is known as committee No. 1, or that on signaling practice, of the Railway Signal Association, and No. 10 of the American Railway Engineering Association. The appointment of an official of an electric railway to this important committee is an excellent testimonial of the opinion of these two associations of the signal practice of the Illinois Traction System, as well as of the engineer in charge, Mr. Leisenring.

David A. Munro, who has been assistant to the auditor of the Second Avenue Railroad, New York, N. Y., and in addition has had charge of the purchasing of the company, has resigned, and on Dec. 1 will enter the sales department of the J. N. Johns Manufacturing Company, New York. Mr. Munro was born in Scotland. He entered the service of Messrs. Joline and Robinson, receivers of the Metropolitan Street Railway, New York, in the auditor's office of that company on Oct. 8, 1907. On Nov. 20, 1908, he resigned from the Metropolitan Street Railway to enter the service of the late George W. Linch, receiver of the Second Avenue Railroad, as assistant to the auditor. In addition to his work as assistant to the auditor of that company, Mr. Munro later took charge of the purchasing of the company.

L. O. Gordon, who has been appointed general manager of the Jackson Light & Traction Company, Jackson, Miss., entered the power and mining department of the Chicago office of the General Electric Company in 1902, and four years later was sent to the Schenectady works of the latter company. After spending a year in Schenectady, he was transferred to the Minneapolis office, where he remained in the apparatus and motor departments for five years. In the fall of 1912 Mr. Gordon left the General Electric Company to take the position as general manager of the Valparaiso (Ind.) Lighting Company, operating a combination gas and electric property. The property at Valparaiso is owned by the American Public Utilities Company, Grand Rapids, Mich., which also controls the Jackson Light & Traction Company.

Judge W. H. McHenry will become general counsel and head of the claim department for the Des Moines (Iowa) City Railway on Jan. 1, 1917. Judge McHenry is one of the most able and best known lawyers of Iowa. He was born in Des Moines and was admitted to the bar in that city. After nearly a score of years of exceptionally successful practice he was elevated to the district bench in his home city and served there for fourteen years. Following his recent retirement from his judicial duties came the announcement that he is to take up the important legal work of the Des Moines street railway system. He is fifty-five years old, and as the result of his long experience in the practice of law and on the bench he is regarded as admirably fitted for the work he is about to begin. The safety-first campaign of the company, referred to at length elsewhere in this issue, will be under the direction of Judge McHenry, with Dan M. Finch, claim agent of the company, in direct charge of the work.

William A. Driscoll has been appointed general claim agent of the Bay State Street Railway, with headquarters at Boston. Mr. Driscoll was born in Lawrence, Mass., in 1884, and was educated in the public and high schools of Lowell, Mass. At the age of twenty-one he entered the employ of the Boston & Northern Street Railway, being located at the Middlesex Street shops in Lowell. After two years' experience in the shops and in the local supply department at Lowell he went to Boston and for two and one-half years was in the office of the company's purchasing agent. For the last seven and one-half years Mr. Driscoll has been claim agent of the Bay State company in charge of the lines centering in Lowell, and in general extending from Nashua, N. H., to Boston. About 250 miles of track are included in this district. In his new work, Mr. Driscoll will have charge of claims on the whole system, which now comprises about 1000 miles of track. He is a member of the New England Street Railway Club. His appointment as general claim agent dates from Nov. 1.

B. C. Cobb, vice-president of Hodenpyl, Hardy & Company, investment bankers, New York, N. Y., has been elected president of the Northern Ohio Traction & Light Company, Akron, Ohio, to succeed Henry A. Everett, as noted briefly in the ELECTRIC RAILWAY JOURNAL of Nov. 18. Mr. Cobb was born in Boston, Mass., on Aug. 13, 1870. He attended the Boston Latin School and later on went to Andover. Mr. Cobb has been in public utility work for about twenty years. He began his career in the office of the Grand Rapids (Mich.) Gas Company in 1894. He rose rapidly in the firm and in 1898 became general superintendent of the Detroit (Mich.) Gas Company. Three years later he left Detroit to become vice-president and general manager of the Saginaw-Bay City Railway & Lighting Company. In 1906 he became a member of Hodenpyl, Hardy & Company, with headquarters in New York City. At the present time Mr. Cobb is president of the following companies: Michigan Railway, Jackson, Mich.; Consumers Power Company of Michigan; Michigan Lighting Company; Northern Ohio Traction & Light Company, Akron, Ohio; Rockford & Interurban Railway, Rockford, Ill.; Central Illinois Lighting Company, Peoria, Ill.; Evansville Railway & Light Company, Evansville, Ind.; Springfield Light, Heat & Power Company, Springfield, Ohio; Springfield Railway & Light Company, Springfield, Ill. He is also vice-president of the Grand Rapids (Mich.) Railway Company, and a director in the Commonwealth Power, Railway & Light Company, Jackson, Mich., and in the Tennessee Railway & Light Company, Chattanooga, Tenn.

OBITUARY

Edward H. Gagne, storekeeper of the Bay State Street Railway at Fall River, Mass., is dead. He succumbed to an attack of pneumonia after a few days' illness. Mr. Gagne was thirty-two years old. He was unmarried.

David MacKeen, formerly president of the Halifax (N. S.) Electric Tramway, died on Nov. 13, aged seventy-seven years. At the time of his death Mr. MacKeen was Lieutenant-Governor of the Province of Nova Scotia. He was born in the Province and was identified with many commercial, industrial, banking and electrical interests.

John W. Barnes, who for many years was connected with the Buffalo (N. Y.) Street Railway, now included in the International Railway, and later was general superintendent of the Western New York & Pennsylvania Traction Company, Olean, N. Y., was instantly killed by an Erie Railroad express train at Friendship, N. Y. His wife, who was with him, was also killed.

Charles H. Guckel, formerly general manager of the Springfield (Mo.) Traction Company, is dead. Mr. Guckel retired from the company in Springfield in April, 1915. He had been connected with public utility companies for more than eighteen years. Before going to Springfield Mr. Guckel was engaged in public utility work at Boise City, Idaho. He was also at one time connected with the Swan Falls Power Company and with the Swan Falls Interurban Railroad.

Lawton T. Hemans, chairman of the Railroad Commission of Michigan, died at Battle Creek, Mich., on Nov. 17, in the sixty-third year of his age. Mr. Hemans was born in Collamer, Onondaga County, N. Y., and went to Michigan in early life. He was educated in the high schools, and in 1887-1888 was a student in the University of Michigan Law School, and admitted to the bar in 1888, and practiced law at Mason. In 1892 and for five subsequent terms he was Mayor of Mason; in 1901-1903 he was a member of the Michigan House of Representatives, and in 1907 was a member of the State Constitutional Convention. In 1908 and 1910 he was nominated for Governor by the Democrats, and was defeated. He was appointed a member of the Railroad Commission of Michigan in 1911.

James H. Whitaker, assistant superintendent of distribution of the Puget Sound Traction, Light & Power Company, Seattle, Wash., is dead at the age of sixty-three. Mr. Whitaker was born in Illinois on Feb. 19, 1853. In 1895 he went to St. Paul as manager of the Northwest Engineering Company. He remained in St. Paul for fourteen years. He then joined the electrical engineering forces of the Northern Pacific Railroad, which connection brought him to the Pacific coast. He resigned from the Northern Pacific Railroad to become city electrician of Tacoma and later entered the employ of the Seattle-Tacoma Power Company, with which company he was connected at the time of its absorption by the Puget Sound Traction, Light & Power Company. He is survived by two sons and a daughter.

FRONTIERSMEN WELCOME ELECTRIC TRAIN

The Chicago, Milwaukee & St. Paul Railway is now electrified for a distance of 440 miles in Montana, over two mountain ranges from Harlowton, Mont., to Avery, Idaho. Through Missoula, near the western terminus of the electrified section, all regular freight and passenger trains are being drawn by electric locomotives and nearly all the extra trains are so handled also. A so-called "steamer" shows up once in a while, however, as the Chicago, Milwaukee & St. Paul has not received all of its electric engines from the General Electric Company.

When the first passenger train drawn into Missoula over the Milwaukee arrived there was a good-sized crowd at the station. In that crowd were Granville Stuart, who discovered gold in Montana; E. S. Paxton, famous throughout the country as an Indian artist, and formerly an Indian fighter; Major Catlin, one of the leaders in the Indian wars, and Judge F. H. Woody, who arrived in what is now Missoula in 1856. All of this quartet came into Montana with bull teams, and each marveled at the progress of the age when he saw the first electric locomotive slide out from Hellgate Canyon, pulling its long line of steel coaches.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Panama Traction Company, Jamestown, N. Y.—Incorporated to construct and operate railroads. Capital stock, $60,000. Directors: B. L. Davis, Lakewood; N. M. Sanderson and C. C. Farnham, Buffalo. [Nov. 4, 16.]

***Cheyenne Railroad, Strong City, Okla.**—Incorporated to construct a line from Strong City to Cheyenne, 7 miles. Capital stock, $10,000. Incorporators: J. C. Mytinger, L. T. Cranberry and J. R. Jones, Wichita Falls, Tex.; W. S. Haid and T. A. Cushman, Clinton, Okla.

Waupaca Electric Service & Railway Company, Waupaca, Wis.—Incorporated to take over the holdings of the Waupaca Electric Light & Railway Company, operating the light plant in Waupaca and 5.4 miles of railway.

FRANCHISES

Eureka, Cal.—The Humboldt Transit Company will voluntarily forfeit its franchise for operating cars on T Street. The company discontinued operation owing to lack of patronage.

Evanston, Ill.—The Chicago, Fox Lake & Northern Electric Railway has asked the Council of Evanston for a fifty-year franchise to construct a line in Evanston. [Nov. 4, '16.]

Rochester, N. Y.—The New York State Railways has asked the Council for a franchise to construct a line to connect with the existing double tracks at Clarissa and Exchange Streets, thence through Clarissa Street to Plymouth Avenue and in Plymouth Avenue, connecting with existing double tracks in Clarissa Street and Caledonia Avenue near the bridge over the Western New York & Pennsylvania Railroad.

Elyria, Ohio.—Mayor Rolph has vetoed the franchise recently granted the Cleveland, Southwestern & Columbus Railway by the Council of Elyria.

Philadelphia, Pa.—W. S. Twining, director Department of City Transit, has forwarded to the Public Service Commission in Harrisburg a formal application for a certificate of public convenience for the construction of a double-track surface passenger railway, beginning at Frankford and Oxford Avenues and extending along Oxford Avenue to Castor Road, Bustleton Avenue to Verree Road and thence through private property along a proposed extension of Verree Road to Byberry Road, Worthington Road, Southampton Road, to Byberry and Bensalem Pikes.

TRACK AND ROADWAY

Springfield (Ill.) Consolidated Railway.—Work will be begun on the extension of the Bergen car line as soon as the State Public Utilities Commission of Illinois acts on a petition of convenience and necessity filed by the company. The proposed route will be on Capitol Avenue, east along Cressey Avenue, to Monroe Street, thence east to Eastdale Avenue to the southern line of Washington Street, and thence along Bergen Park. The extension will be about a mile long, of single track, and it is estimated will cost $13,000.

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind.—The General Railway Signal Company has just completed the installation of 11 miles of automatic signaling apparatus on this company's line.

Grand Rapids, Grand Haven & Muskegon Railway, Grand Rapids, Mich.—Plans are being considered by the Grand Rapids, Grand Haven & Muskegon Railway for double-tracking its line. It is proposed to construct about 10 miles during the coming year and add about 3 miles each year until the entire line is double-tracked.

Fallon (Nev.) Electric Railroad.—This company reports that its line from Fallon to Sand Springs has not yet been completed, but it is expected that the line will be ready for operation next spring. [March 25, '16.]

Albany Southern Railroad, Albany, N. Y.—James E. Hewes, general manager of the Albany Southern Railroad, has notified Mayor Burns of Troy that the company has decided to construct an extension to Troy.

Buffalo & Lake Erie Traction Company, Buffalo, N. Y.—The Dunkirk City Council has asked the Buffalo & Lake Erie Traction Company to raise its tracks through Doughty Street, which is being repaved.

New York & Queens County Railway, Long Island City, N. Y.—Operation has been begun on this company's new line from Corona to Flushing via Peartree Avenue, Pell Street and Shell Road.

New York (N. Y.) Connecting Railroad.—An order has been placed by the New York Connecting Railroad with the Westinghouse Electric & Manufacturing Company for all the catenary hangers to be used in its construction work.

Ohio Electric Railway, Cincinnati, Ohio.—It is reported that this company will soon extend its North Fourth Street car line in Newark to take in the northwestern part of the city. The line would be extended on Maple Avenue to Channell Street and then to the Mount Vernon road to the new extension of Sixteenth Street to Church Street, where it would connect with the Church Street line at the carhouse.

Oklahoma & Interstate Railway, Oklahoma City, Okla.—It is reported that work will be begun on this company's proposed line from Columbus to Commerce within sixty days. John R. Rose, Oklahoma City, president. [Sept. 2, '16.]

Sand Springs Railway, Tulsa, Okla.—It is announced that the Sand Springs Railway will build an extension of its line from Sand Springs to Pawhuska, about 50 miles. Construction work is expected to begin about Jan. 1.

Tulsa (Okla.) Traction Company.—This company, which is preparing to build an interurban line from Tulsa to Sapulpa, has begun condemnation proceedings in the district court of Tulsa County for the acquisition of a right-of-way through the western half of Tulsa. The proposed interurban line will be built during the coming year, it is announced. It will enter Tulsa over the new concrete bridge spanning the Arkansas River, which is being built by the county at a cost of $200,000.

Toronto (Ont.) Street Railway.—The Ontario Railway & Municipal Board on Nov. 13 gave its decision in the Pape Avenue extension matter, which has been under consideration for many months. An order was issued directing the city to construct and the Toronto Street Railway to equip and operate a line along Wilton Avenue to Broadview, north on Broadview to Gerrard, along Gerrard to Carlaw to Guelph and Pape and north on Pape to Danforth Avenue.

Toronto (Ont.) Suburban Street Railway.—A report from this company states that it has now under construction 46 miles of new track.

Philadelphia, Pa.—Bids will be received by William S. Twining, director Department of City Transit, 754 Bourse Building, until Dec. 7 for the construction of a section of the Broad Street subway about 300 ft. long and 106 ft. wide, embracing four tracks with two station platforms, and including the underpinning of the west side of City Hall and also the Market Street subway.

Montreal Tramways & Power Company, Montreal, Que.—This company will construct an extension on Park Avenue, Montreal.

Carolina Rapid Transit Company, Clinton, S. C.—Surveys of this company's proposed electric railway from Spartanburg to Clinton have been completed by Reid Tull, chief engineer, Spartanburg. [July 8, '16.]

Ogden, Logan & Idaho Railway, Ogden, Utah.—It is reported that the Ogden, Logan & Idaho Railway will construct an extension from Logan through the canyon to Bear Lake.

Salt Lake & Ogden Railway, Salt Lake City, Utah.—This company reports that it expects to double-track its line between Clearfield and Layton, 4 miles.

Salt Lake & Utah Railroad, Salt Lake City, Utah.—It is reported that this company proposes to construct a line from Salt Lake City into the Sanpete Valley at a cost of $1,000,000.

***Richmond, Va.**—Plans are being contemplated for the construction of an electric railway from Richmond to Forest Hill to Bon Air, 7 miles. It is reported that T. S. Wheelwright, president, Virginia Railway & Power Company, is interested.

Puget Sound Traction, Light & Power Company, Seattle, Wash.—It is reported that this company contemplates an expenditure of $1,250,000 for reconstruction and extensions.

***Morgantown (W. Va.) Interurban Railway.**—This company plans to construct a line from Morgantown, W. Va., to Port Marion, Pa., 20 miles. J. McDermott, Price Building, Morgantown, is reported interested.

Wisconsin Valley Electric Company, Wausau, Wis.—It is reported that this company will construct an extension to Stevens Point, and possibly to Grand Rapids.

SHOPS AND BUILDINGS

Kansas City (Mo.) Railways.—It is reported that the Kansas City Railways will construct five new carhouses and will provide gymnasiums and shower baths. The company will also erect a number of dwellings for its employees.

London & Port Stanley Railway, London, Ont.—This company reports that the construction of a one-story addition to the office section of its shops and a 65-ft. addition to the shops are almost completed. The cost will be about $20,000. The company is building a bathhouse at Port Stanley at a cost of $25,000.

Valley Railways, Lemoyne, Pa.—It is reported that the Commonwealth Trust Company of Harrisburg has taken title to the properties on the block bounded by Walnut, River, Fahnestock and Strawberry Streets for the Valley Railways, to be used as the site for a large terminal and waiting station.

Philadelphia, Pa.—W. S. Twining, director Department of City Transit, has filed an application for a certificate of convenience to permit the construction of a station on the Frankford Elevated line at Huntingdon Street and Kensington Avenue. This station will be midway between the stations at Dauphin and York Streets and the Somerset Street Station.

Wheeling (W. Va.) Traction Company.—Installation of new machinery in the machine shop and the laying of new switches, to cost several thousand dollars, will be made by the Wheeling Traction Company at its island shops.

POWER HOUSES AND SUBSTATIONS

Iowa Railway & Light Company, Cedar Rapids, Iowa.—A hydroelectric power plant is being built by the Iowa Railway & Light Company at First Street, East Avenue and River, to cost about $90,000. The Fargo Engineering Company, Jackson, Mich., are engineers.

Albany (N. Y.) Southern Railway.—It is reported that this company contemplates the extension of its electric power lines from Hudson, N. Y., to Pittsfield, Mass.

Columbus Railway, Power & Light Company, Columbus, Ohio.—This company will extend its transmission lines to Centerburg.

Toledo Railways & Light Company, Toledo, Ohio.—Announcement has been made by Henry L. Doherty that plans are being completed for a new central station for Toledo which may have a capacity of 120,000 kw. It is possible that it will be located on the old rolling mill property on the East Side, but if this is too high for the purpose, the station may be placed outside the city limits. The Water Street plant will be used to supplement the new plant. The cost will be about $6,000,000.

Monongahela Valley Traction Company, Fairmont, W. Va.—This company has purchased the property of the Consumers Light Company, and plans to construct 7 miles of high-tension transmission line to permit utilization of power from its central power plant and abandoned present power plant at Mannington. The company will also rebuild and rearrange its distribution lines and change transformers to permit distribution at 2300 volts instead of 1100 volts.

INDUSTRIAL NEWS

Review of Trade and Market Conditions

Rolling Stock Purchases Business Changes Trade Literature

WHO SHOULD CARRY THE REPAIR PARTS STOCK, THE RAILWAY OR THE MANUFACTURER?

Small Roads Most Greatly Concerned—Manufacturers Give Opinions—Several Argue for Standardization

It has been pointed out that "the average railway buyer thinks the manufacturer is not fulfilling his obligation to the railway if he sells something to it and then does not always carry in stock, ready for immediate shipment, all parts of that particular device which are subject to wear and breakage." "In fact," a manufacturer of heavy machinery writes, "most of the buyers feel that it is an imposition on the railway to expect it to carry a reasonable stock of repair parts. This feeling is, no doubt, based on the ground that if the manufacturer was really anxious to give service to the road he would carry repair parts so that they could be shipped out on short notice. If the roads' wishes in this respect were fully met, the overhead charges would shortly put the manufacturers out of business."

This question is a problem surrounded by special conditions and, of course, cannot be answered definitely, but there should be some uniform underlying premises which will help decide individual situations. What now seems reasonable to most railways apparently is viewed as an imposition by some manufacturers.

To direct thought to the repair-part-stock subject, this paper addressed a number of manufacturers, asking them how far they thought a manufacturer should go in tying up capital in repair parts. The answers cannot be summarized because conditions vary so greatly in different lines of manufacture. However, the thought prevails that the manufacturer should be prepared to take care of his customers' requirements by furnishing repair parts, but the railway should see to it that enough local stock is carried to avoid the necessity of rush orders for repair parts, particularly those parts which are subject to periodic renewal because of wear. The following statements are abstracts of the replies received:

NIC LE GRAND, ST. LOUIS CAR COMPANY, SAYS REMEDY LIES WITH MANAGER AND STOREKEEPER

"The sale of a product carries with it the implied promise on the part of the manufacturer to take care of his customer's needs for repair parts. However, the railway company must co-operate, and if co-operation is lacking results can only be unsatisfactory. What is said here on this subject refers to the smaller properties only. The large ones take care of themselves. They have their own patterns, and on account of the big volume needed are in position to contract for their yearly requirements. This the smaller companies cannot do.

"In order to 'keep things going' it is necessary to carry some stock of wearing parts. Car and truck parts are here particularly referred to, and our views are based on an experience of fifteen years in 'watching' supply orders. For the manufacturer to carry a large stock of brakeshoes, brake heads, brasses, brake hangers, center plates, side bearings, springs, wheels, axles, etc., is expecting too much. To do this would require an immense investment. And yet in normal times some of us come very near overstocking. On the other hand, to lay in an emergency stock of wearing parts calls for only a small outlay on the part of the railway company. It has been demonstrated that regardless of the investment, this pays. Delays in getting much-needed parts are vexatious and costly; cars are out of service; earning capacity is lost. The public complains about service, or rather the lack of it. The manager has a talk with the superintendent. He 'calls' the master mechanic, who in turn 'takes it up' with the purchasing agent, and the latter may possibly call up the storekeeper. It may turn out that orders were issued 'not to buy a darn thing 'til needed.' In tabloid form the history of the case may be presented like this:

"A two-cent stamp = Telegrams;
"Freight charges = Expressage;
"Efficiency = Passing the buck.

"This is by no means a new discovery. It is only emphasized at this time on account of the unusual conditions.

"Drawing further upon our experience and taking one manufacturer as an example: This one has more than 13,000 patterns for gray iron, malleable, steel and bronze castings, all accumulated during some twenty years. Many of these were provided in the first place to meet the views of the purchaser, when some standard pattern could have been used. And of these 13,000 patterns about 10,000 are alive, being used to fill repair orders. The cost of keeping up these patterns (most foundry work is rough) is considerable. Surely it is hardly fair to expect the manufacturer to carry a stock of all these parts.

"The remedy lies with the railway company's management and the alertness of the storekeeper. The management should permit the carrying of stock, and the storekeeper should be watchful in guarding the best interests of his company. Particularly should intelligent attention be devoted to malleable and steel castings. Two helpful methods suggest themselves. The first is that when new cars and trucks are purchased, a small stock of all wearing parts should be ordered to be shipped with the new equipment. The second is that needs for at least six months should be anticipated and deliveries stipulated as required. This will insure having parts when needed, avoid much delay and expense and often prevent unpleasantness.

"In this day of boasted efficiency and of carefully-kept minute records, master mechanics know what is needed and should be permitted to requisition in advance. This may be done with safety. Permit me to cite one species of fault peculiar to railway buying: The salesman calls on the purchasing agent and runs through the list of his wares. 'Nothing doing to-day.' He calls on the master mechanic. 'Nothing doing to-day.' The storekeeper is called up. 'Nothing doing to-day.' A week, perhaps ten days, later, a telegram comes in pleading for immediate shipment of parts, which must be made, and shipment is wanted by express. Isn't the point obvious?

"This very experience has been mine, not once but more than a hundred times, and it often has happened with properties of considerable size and importance, properties which were wisely and ably managed in all other directions.

"The manufacturer has parts to sell, is concerned about increasing his sales and is doing his level best to make prompt shipments, and it is up to the buyer to co-operate intelligently with him by placing orders ahead and not waiting until cars are pulled into the barn. He should be doing it for his own protection, benefit and advantage."

DEMAND SHOULD DETERMINE STOCK TO BE CARRIED

S. M. Wilson, of The J. G. Brill Company, says that the subject of how far a manufacturer should go in keeping in stock renewal parts for service repairs to his product is an important one and one to which his company has given a great deal of attention, particularly with regard to trucks. He also says:

"The larger railroads, of course, keep on hand supplies of renewal parts, but it is a hardship for the smaller railroads to do so, and as equipment awaiting repair parts is often out of commission during that period, it is highly important to the small system that in buying vital parts of operating equipment, such as car trucks, due consideration should be given to the matter of future replacement of worn or broken parts and a standard product be purchased which will insure this.

"The question of just how far we should go in keeping renewal parts actually in stock is determined by the demand for such parts, and this means experience covering a long period. We have a well-organized supply department which makes a study of all such matters and sees to it that stocks of parts that may be called for will be promptly supplied. We believe that the service end of this business is immensely important to the lasting success of any of our products."

Standardization and Costs Will Be Reduced

S. A. Bullock, of the Baldwin Locomotive Works, is of the opinion that the manufacturer should not be called upon to carry finished repair parts in stock, but only such raw material as will enable him quickly to fabricate the parts desired. He also says:

"Should manufacturers add to the first cost the burden of holding in stock parts for periods of time ranging from one to ten years, then the purchaser might as well buy outright such parts and have them for immediate replacement.

"It has been our aim to standardize electric trucks, but the continual changes, due to the improvements in the art and requisition changes on the part of the customer, have radically modified the design of a few years ago. Formerly we carried in stock certain truck parts, and now we have most of this material on our hands. In explanation, we can only assume that the parts were not needed by the customer or that he bought elsewhere.

"We welcome the time when trucks shall be standardized as in the automobile industry, and when this time comes the manufacturer will gladly keep a full stock of renewal parts for service repairs."

Heating Equipment Stock Available But Delivery Uncertain

Elmer J. Smith of the Peter Smith Heater Company says that the heater repair business is always heaviest in the fall. According to Mr. Smith:

"It is simply impossible to carry all the parts needed, owing to the difficulty in gaging the requirements. However, we endeavor to increase our stock to a considerable extent at the time of the year when these parts are most needed and as a rule we are able to make very prompt deliveries.

"When abnormal business conditions exist, such as at present, we are unable to contract for our wants and get the material as fast as we would like to, even though we try to anticipate our wants. We don't think that it is necessary for the railway companies to carry a large stock of heater repair parts, but if they want real service and don't want to hold up their cars, the safest way is to have repair parts in their bins and to anticipate their wants, the same as we aim to do.

"An electric railway is taking great chances these days if it doesn't carry these repairs in stock, for the freight deliveries at this time are unreliable and the purchaser takes all the chances as to when he will get the goods, even though prompt shipment is made."

Demands Small for Stoker Repair Part

The manufacturer of a widely-used type of stoker states that repair parts for non-standard equipment are not carried in stock, but that full stocks of standard parts are carried; first, because the customer is entitled to the service and second, because it is good business to sell the parts. Every standard part can be shipped on the day the order is received. Repair parts are kept in stock in proportion to the total number of stokers in operation. Consequently the amount tied up is growing large.

Crane Manufacturers Advise Customers to Carry Repair Parts

Three manufacturers of overhead traveling cranes and allied equipment discussed this subject. One says that customers fail to realize the amount of money that is tied up in spare parts of cranes and hoists of different types and voltages. Another crane manufacturer says, "We have made it a point to offer the suggestion to users of our cranes that they carry certain parts in stock, and we supply them with a list showing the parts that under ordinary service will at times require renewal."

Another large manufacturer of cranes writes in part as follows: "While the general design is standardized, practically no two cranes are of the same size, lift, etc. This makes it very difficult to carry spare parts covering every part of the machine, but we do endeavor to carry spare parts of those portions of the machine which are standardized. We have a storeroom devoted especially to that purpose.

"Nevertheless, our advice would be that the customer carry spares for his cranes. Many times, as in the past summer, those who furnish us with castings are unable to supply them as fast as wanted. Sometimes strikes interfere with the supply of this material, and the demand absorbs our available stock before we can replace it. Sometimes, as it happened repeatedly during the past season, makers of electric motors have been unable to furnish us spare parts for their motors as fast as wanted, owing to a scant supply of copper. We, of course, endeavor to anticipate these troubles as much as possible, but in spite of all efforts some delays have been encountered which would have been avoided had the customers anticipated their requirements and carried a stock of standard spare parts.

"The question is a very interesting one. We have gone so far as to send out circular letters to users of our product calling attention to the fact that unavoidable delays are to be expected under the present unusual conditions. Very few customers pay any attention to these letters. Those who pay the least attention to them are usually the first to complain if there is any delay in spare-part service on our part."

Standardized Parts Simplify Problem

Referring to the products of the Stow Manufacturing Company, which have largely been standardized, D. Walker Wear says:

"It is our practice to carry in stock for immediate shipment all repair parts necessary to renew Stow flexible shafts. Whenever possible, however, the customer should return the tool to our laboratory where men familiar with the work can properly assemble and test it before return. We agree with the average railway buyer that he should be able to get from the manufacturer, immediately on telegraphic orders, necessary repairs for his equipment. It is the business of the manufacturer to carry repair parts, as the railway storehouses are filled with all classes of supplies for making repairs, some of which rapidly deteriorate from lack of proper storage facilities. If the manufacturer carries a stock and furnishes it fresh and clean to the railway, it is then up to the mechanical department to apply it. In most cases this will give better service. With standardized products we cannot see where the manufacturer should object to tying up capital in repair parts. In our experience it has not developed that a stock of repair parts becomes obsolete. The manufacturer is in a position to govern his product in accordance with his sales and to adapt his improvements to tools already in use.

"I occupied for several years a position with one of the principal railroad systems operating steam and electric equipment, and there I found it more satisfactory to carry a minimum stock for my storehouse and have the manufacturer carry the repairs for our equipment. There was not a single case where the manufacturer did not desire to co-operate. I found it not only to my advantage but also to the advantage of the manufacturer, to anticipate my requirements by sixty and ninety days on wearing parts. This enabled the manufacturer to make prompt shipment and to save the company money by having the order requisitioned and shipment handled in the regular way, coming forward by freight, wherever possible, over our own lines."

John Benham Recites Register Company Practice

"We feel that we are giving our customers very liberal treatment," says John Benham of the International Register Company. "We bought out the New Haven Register Company thirteen years ago and up to within the past two years we have aimed to be in a position to fill with reasonable promptness all orders for repair parts for New Haven registers. We feel now that we have reached the limit, and while we will fill orders for any parts we have, we do not feel called upon to make up parts that we do not have; and anyway these registers should be about worn out now.

"So far as International registers are concerned we commenced the manufacture of the type R-7 single register in 1901 and the type R-5 standard double register in 1902. There have been slight modifications in these registers so that repair parts for the present type in some instances would not be just right for the older types, especially the double registers. Notwithstanding that, we have aimed to be in position to fill, generally upon receipt of order, any demands upon us for repair parts."

TRACK-DRILL REPAIR PARTS NOT A BURDEN

J. McKinnon, Kalamazoo Railway Supply Company, believes that "the railroads should anticipate their wants to a certain extent and carry in stock some of these parts and not expect the manufacturer to make immediate shipment of the few parts that may be needed. For instance: Take our track drills, of which we have many thousands in service. The parts which are liable to wear out are inexpensive, and it would not be a great burden upon the railroad to carry a reasonable amount of such parts, so that the machines would not be out of commission any longer than is necessary to make replacement of the part in question.

"There was a time when the railroads did carry large stocks of repair parts. In fact, I think they were overburdened in this respect. But with the depression in railroad business orders came for retrenchment. This meant a depletion of their stores and as business at that particular time was rather light, the manufacturers made up greater numbers of these parts than usual for the purpose of keeping their men together; so, when the railroad needed anything in a hurry they were able to get it. Now that business is a little more brisk and the roads are buying more freely, we believe they should replenish their stocks, but not to the extent they did previous to the time when they were ordered by the managements to retrench.

"The same comments apply to our hand, push, velocipede, track-laying, and motor cars. The large systems are buying their spare parts more freely than they did some little time since, and we really do not believe it is the intention of the railroads to be unfair with the manufacturers."

SEND NOTICE WHEN DESIGN IS TO BE CHANGED

Irving T. Hartz, Morden Frog & Crossing Works, holds the view that "a concern should have the dies and patterns ready to fill all orders for repair parts of machines within a reasonable time, and for tools, a stock of repair parts for all standard tools in use.

"When a machine or tool is considered by the manufacturer as getting obsolete, a notice to all who have been purchasers of such machines or tools should be sent, advising them that within six months or one year the dies or patterns for such tools would be destroyed and if they have the machine or tool in use and desire any additional parts, to order at once.

"No railroad can expect a manufacturer to carry the repair parts for a great many makes of machines that can be made by any one manufacturer, ready to supply all users, as some might never be called for. This would mean dead stock. The most that should be asked of the manufacturer is to be prepared to furnish repairs within a reasonable time."

RUBBER-COVERED WIRE BUYING CONDITIONS IMPROVING

Manufacturers and jobbers are making a better profit in rubber-covered wire to-day than ever before. The demand is large and the output is not sufficient. Rubber-covered wire, being a staple, never was very profitable. Until quite recently it was sold on a basis of the best price. Thus a buyer would place an order at to-day's prices, say 21 cents, for four months' delivery. If at the delivery date the prevailing price was 18 cents the buyer expected this price and received it, although the contract was made at 21 cents. If, on the other hand, the price had advanced to 23 cents, the buyer held to the contract price of 21 cents. The buyer therefore was protected against any advance in the market, but he also received the benefit of any decrease in market prices.

Under such a scheme it was nothing more than heads the buyer wins, tails the seller loses. With the margin of profit always small it often reached the vanishing point on a rising market. To-day, however, all of this has been changed. Wire is bought at the delivery market price of copper-wire base. The benefits of a rising market are now going to the seller.

A question arises, however, of just how much of this apparent profit can be counted a real profit. Just so sure as more money is made on a rising market just so sure is less money made on a falling market. If stocks are small and the decline very gradual the drop in profits is very small. If stocks are large and the bottom falls out of the market then instead of a profit a loss is taken. If the market recedes in the same manner and rate it advanced and if stocks were the same in both cases then the increase in profit on the rising market would just offset the decrease in profit on the falling market.

BAY STATE STREET RAILWAY TO REMODEL 200 CARS

The Massachusetts Public Service Commission has authorized the Bay State Street Railway, Boston, Mass., to reconstruct 200 semi-convertible cars, the work to include changing to the pay-as-you-enter type by removing the bulkhead and bulkhead doors; installing the National Pneumatic Company's air operated vestibules and steps, with an electrical device to prevent the starting of the car before the doors are closed, equipping the cars with a buzzer system with push-button on each window post; installing fare boxes, etc. At this writing the selection of part of the equipment has not been made, but work has been under way for some weeks on cars in the shops at the south of Boston. One car has been placed in service within the past four days, and it is hoped to push the remodeling as rapidly as possible during the winter and early spring.

ROLLING STOCK

London & Port Stanley Railway, London, Ont., is reported to be in the market for three trail cars.

North Carolina Public Service Company, Greensboro, N. C., has ordered two city cars from the Southern Car Company, High Point, N. C.

Rutland Railway, Light & Power Company, Rutland, Vt., has ordered through the Wendell & MacDuffie Company Eastern agents for the Russell Car & Snow-Plow Company, one Russell wing elevator snow-plow and flanger.

Citizens Railway, Clarksville, Tenn., noted in the ELECTRIC RAILWAY JOURNAL of Sept. 30, 1916, as being in the market for two double-truck closed cars, has ordered this equipment from the Southern Car Company, High Point, N. C.

Connecticut Company, New Haven, Conn., has ordered through the Wendell & MacDuffie Company, Eastern agents for the Russell Car & Snow-Plow Company, one double-truck combination snow-plow and express car and six sets of flangers for double-end ballast cars.

TRADE NOTES

Ohio Brass Company, Mansfield, Ohio, agent for Crouse-Hinds headlights, has received an order for 200 12-in. headlights from the Bay State Street Railway.

Philadelphia Holding Company, Philadelphia, Pa., has received an order from the Fishkill Traction Company, Beacon, N. Y., for four radial trucks.

Southern Pennsylvania Traction Company, Chester, Pa., have recently purchased four Westinghouse 512C motor equipments, four GE CP 27 straight air-brake equipments and four pair of Brill 76E double trucks.

Nelson S. Moore has resigned as assistant general manager of the Electrical Engineers Equipment Company of Chicago to enter the employ of Lewis & Roth Company of Philadelphia as sales engineer.

Drew Electric & Manufacturing Company, Indianapolis, Ind., announces the addition of G. R. Miller to its organization as sales manager. During the past eight years Mr. Miller has spent most of his time with the Russell M. Seeds Company and with the Schwartz Electric Company of Indianapolis.

E. F. Berger, who has represented the Midvale Steel Company in Chicago territory for a number of years, has been promoted to the position of office manager, and assigned to the Cincinnati office in the Union Trust Building. In addition to his work with the Midvale Steel Company, he will also look after the interests of the Cambria Steel Company and of the Worth Bros. Company.

Holden & White, Chicago, Ill., have been appointed general sales distributors for the Car Lighting Improvement Company of Milwaukee, Wis., manufacturers of the Watson car lighting regulator. This device is designed to give constant illumination of car lights and headlights, irrespective of line-voltage fluctuations. Holden & White have also been appointed general sales distributors for the Anderson Brake Adjuster Company, Omaha, Neb., manufacturers of slack adjusters.

F. B. Gleason, formerly in charge of the Western Electric Company's business in the Far East, with headquarters at Tokio, Japan, has been appointed manager of the southern district of the Western Electric Company, with headquarters at Atlanta, Ga. He will succeed E. J. Wallis, who, on Jan. 1, will take up his new work as manager of the Pacific Coast district, with headquarters at San Francisco, Cal. Mr. Wallis will succeed F. H. Leggett, who returns to the company's executive offices at 195 Broadway, New York City, N. Y.

B. A. Brennan, well known to the engineering and industrial world as contract manager of the Westinghouse Machine Company, and later as sales manager of the power department of the Bethlehem Steel Company, has resigned from the Mercantile Trust Company, St. Louis, Mo., of which he was vice-president, to accept the presidency of the Citizens Company, Inc., Baltimore, Md., to which office he has just been elected. The Citizens Company, Inc., is an investment banking institution, which finances corporations, engages in underwritings and handles complete issues of securities.

Francis A. Vaughn and Hans J. Meyer, of the firm of Vaughn & Meyer, consulting engineers, 1007 Majestic Building, Milwaukee, Wis., have joined in partnership with Chas. L. Pillsbury, of the consulting engineering firm of Chas. L. Pillsbury Company, 805-11 Metropolitan Life Building, Minneapolis, Minn., and 716-20 Capital Bank Building, St. Paul, Minn. Mr. Vaughn and Mr. Meyer will continue to conduct their Milwaukee offices under the firm name of Vaughn & Meyer. The Minneapolis and St. Paul offices will be conducted under the present firm name of Chas. L. Pillsbury Company. The three offices cover a wide range of engineering activities, and the combination of these old and well-known organizations will be able to cover an extensive field.

C. C. Nuckols, who was elected president of the Consolidated Car-Heating Company at the meeting of the directors held in Albany, N. Y., on Nov. 20, 1916, has been connected with the company for the past twelve years. In 1904 he was employed as a salesman in the Chicago office; two years later he was transferred to the New York office as purchasing agent, and in 1908 he was again transferred to the factory at Albany, N. Y., as superintendent and purchasing agent. Since 1912 he has held the position of vice-president and general manager of the company. Mr. Nuckols is thirty-six years old, being born at Versailles, Ky., on Feb. 26, 1880. His education was obtained in the high schools of his native town, at Morgan Park Academy, Morgan Park, Ill., and at the University of Chicago.

Adams-Bagnall Electric Company, Cleveland, Ohio, is now completing an addition to its factory with the installation of a complete vitreous or porcelain enameling plant. The primary object of this addition is to further improve the quality and service of the well-known "Abolite" line of porcelain enameled reflectors for industrial lighting, the porcelain enameled reflectors used in pendent fixtures for street lighting and enclosed arc lamps, as well as some parts used in the manufacture by this company of transformers, electric fans and auto electrical accessory equipment. The steadily increasing demand for these reflectors, as well as faith in the maintenance of this growth, has led the company to make this investment in order to insure increased production facilities and elimination of the extra hauling and handling that is the general practice in the manufacture of enameled steel reflectors. The enameling plant is being equipped for all classes of high-grade vitreous enameling. A battery of four 12-ft. furnaces will be supplemented with complete equipment of mixing vats, smelt furnaces, drying ovens and handling apparatus capable of producing a large output. The plant will be in full operation before Jan. 1, 1917.

ADVERTISING LITERATURE

Ohio Brass Company, Mansfield, Ohio, has sent out an illustrated folder demonstrating how the National railroad trolley guard promotes good will.

Laclede-Christy Clay Products Company, St. Louis, Mo., has distributed an attractive folder telling how the problem of making four boilers equal six was solved. This folder is illustrated and has been carefully prepared.

Templeton-Kenly & Company, Ltd., of Chicago, Ill., manufacturers of Simplex car and track jacks, have issued bulletin No. 216, which is a 34-page booklet, illustrating numerous unusual applications of these jacks.

Vanadium—Alloys Steel Company, Pittsburgh, Pa., is distributing a new pamphlet on "Vasco-Vanadium" steel. It also gives data regarding other alloy steels and their use in tools, gears, springs, etc., together with a complete list of carbon steel extras.

E. C. Atkins & Company, Indianapolis, Ind., have issued an illustrated catalog describing their metal saws. These include circular saws for the different standard machines, flexible-back metal-cutting band saws, "Hoosier" extension hack saws and their new Kwit-Kut power hack saw machine. The last ten pages of this thirty-two-page catalog are devoted to useful information of a miscellaneous nature.

Stone & Webster Engineering Corporation, Boston, Mass., construction engineer, has issued the second edition of its booklet, describing and illustrating industrial plants, office and educational buildings, power stations and warehouses constructed by the company. The work includes a wide variety of construction problems, including those met with on the hydroelectric power stations of the Mississippi River Power Company, the new Massachusetts Institute of Technology, etc.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued leaflet 3865 on its HL unit switch control. The control switch, controller box, control resistors and master controller are illustrated and described. In addition a schematic diagram of the general arrangement of the apparatus and wiring is shown. The company has also issued a very elaborate and profusely illustrated circular No. 1516-A covering electric locomotives for freight haulage. Twenty-two of these Baldwin-Westinghouse electric locomotive installations are illustrated. In addition, particular attention is paid to the description and illustrations of locomotive control, to the centralization of equipment, and to the mechanical parts which make up the electric locomotive.

Van Dorn & Dutton, Cleveland, Ohio, has just issued a valuable 40-page booklet on "Facts About Gears." This digest of specialized gear data contains twenty-one sections, a study of which will enable even the non-technical gear user to figure out complete and accurate specifications for any system of gears. The sections treated are as follows: Different Type of Gears, Facts About Gears, Gearing Terms, How to Order Gears of All Kinds, Spur Gear Specifications, Bevel and Mitre Gear Specifications, Worms and Worm Gears, Sprocket Specifications, Lewis's Rule for Strength of Gear Teeth, Diametral-Pitch Formulae, Diametral-Pitch Table, Circular-Pitch Formulae, Circular-Pitch Table, Decimal Equivalents of 113 Fractional Dimensions of One Inch, Decimal Equivalents of Fractions of Millimeters, Metric Pitch Module, Standard Keyways, Comparative Size of Gear Teeth, Weights of Round Steel, Weights of Metals, Circumferences and Areas of Circles from 1/64 in. to 100 in.

Daniel O'Rourke

Daniel O'Rourke, full of good old mountain dew, was in danger of sinking in a bog when he persuaded an eagle to give him a lift. Then the eagle double-crossed him by dropping him off on the moon—an awful long way from home.

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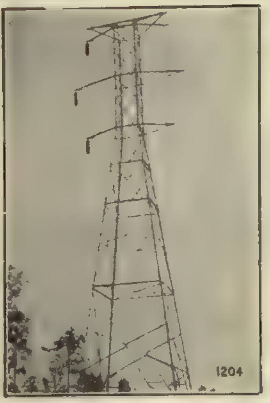

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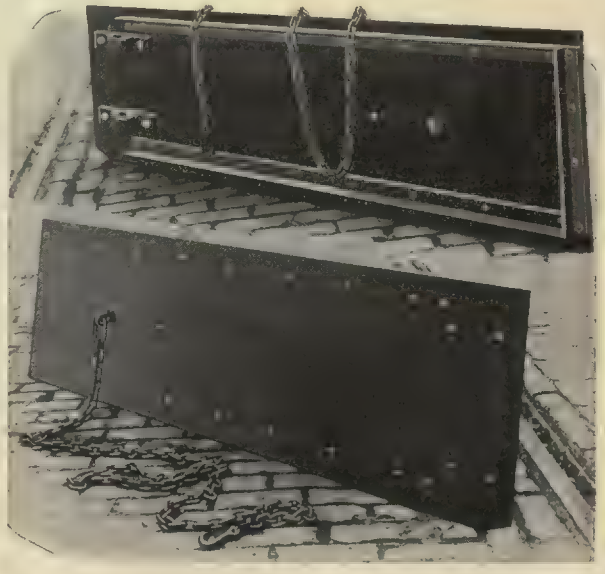

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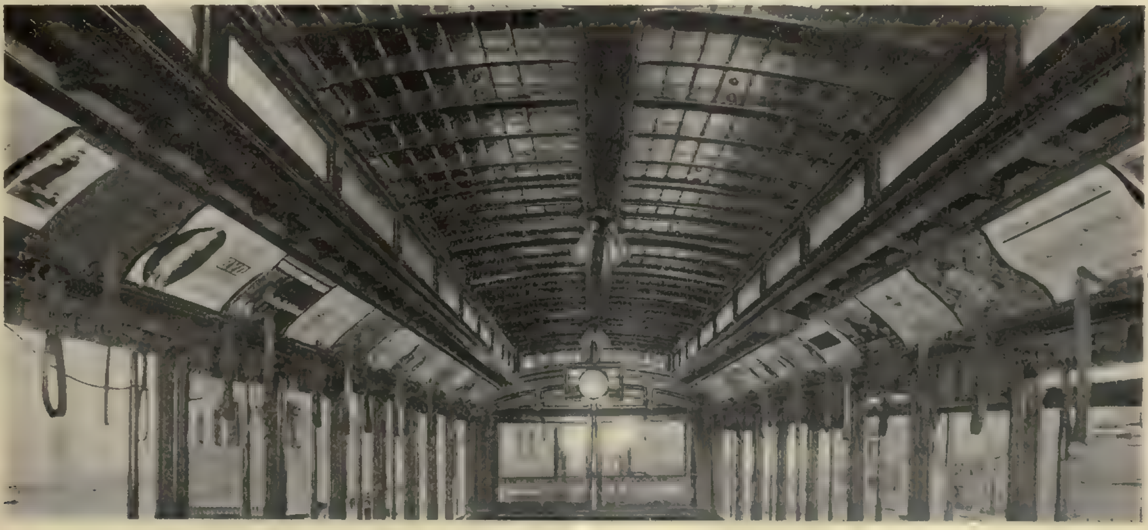

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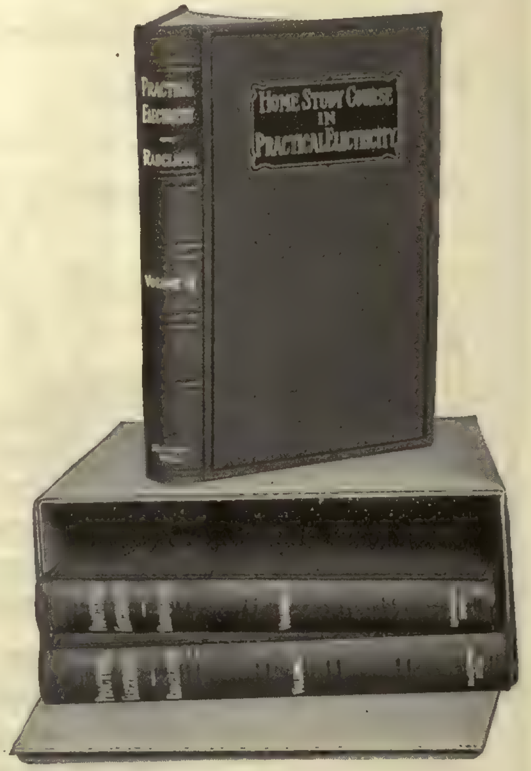

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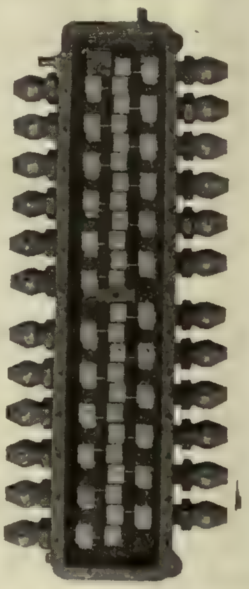

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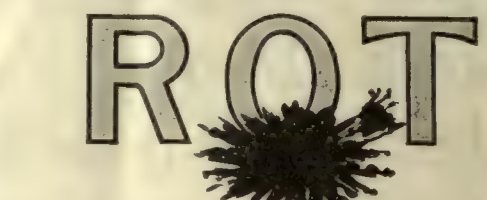

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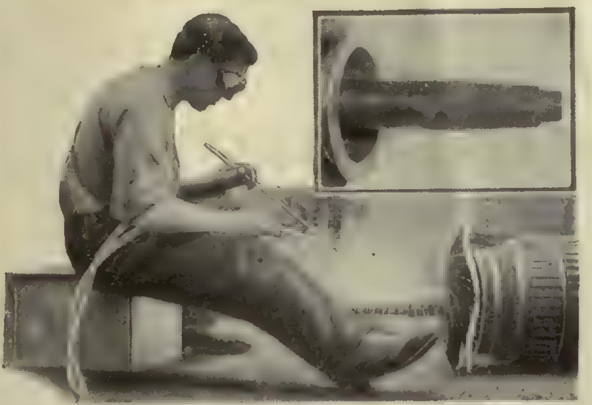

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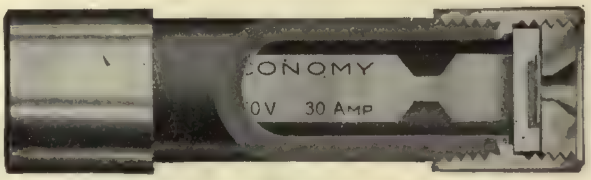

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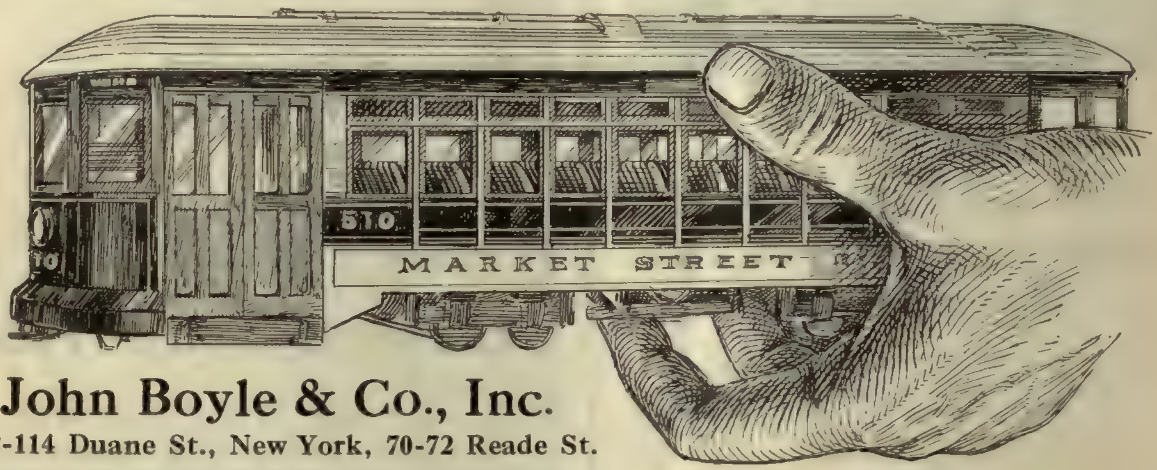

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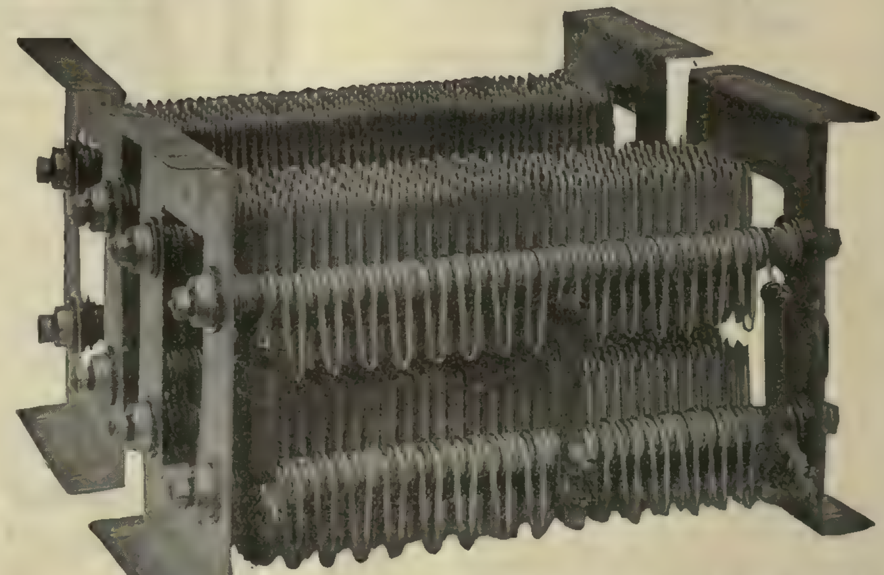

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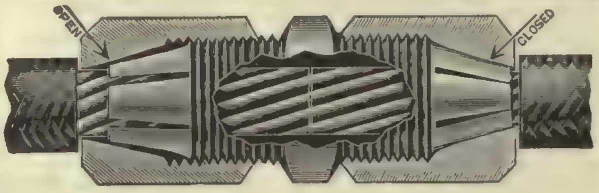

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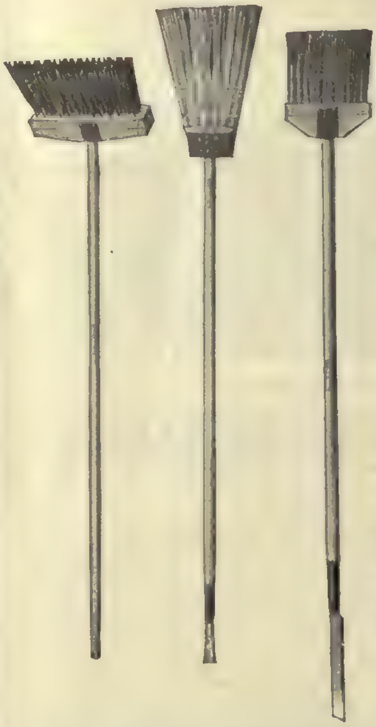

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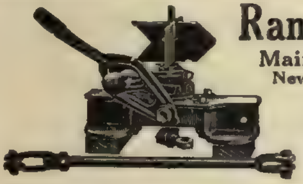

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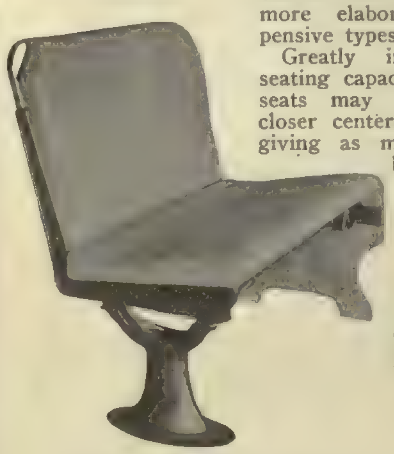

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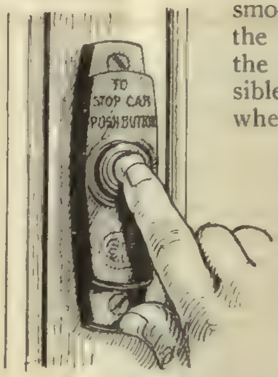
"It Rings From the Trolley"

and gives the motorman an unmistakable stop-signal when passengers wish to alight.

The Consolidated Buzzer System


TO STOP CAR PUSH BUTTON

smoothes the kinks out of the service because it gives the passenger every possible chance to alight just where he wishes. No weak, unreliable dry batteries—there's a "buzz" *every* time the button is pressed.
No exposed metal on push button.
Catalog 10 gives all the details—write for your copy.

Consolidated Car Heating Company
New York Singer Building
Albany, N. Y.
Chicago Fisher Bldg.

WE CAN CUT YOUR COST OF HEATING CURRENT
WRITE FOR THERMOSTATIC CONTROL INFORMATION

GOLD

ELECTRIC HEATERS Cut Installation and Maintenance Charge.
VENTILATORS Also Ventilate in Stormy Weather.
THERMOSTATS Save Current.
ORIGINATED the use of NON-CORROSIVE Wire for Electric Car Heaters.
ORIGINATED The Ventilated Coil Support.

LET US FIGURE ON YOUR NEXT REQUIREMENTS
Gold Car Heating & Lighting Co., 17 Battery Pl., New York

Johnson Registering Fare Boxes
used in connection with the car register increase receipts $1.00 per car, per day, counts metal tickets the same as cash thus giving a positive check on all class of fares.
WRITE FOR NEW BOOKLET

JOHNSON FARE BOX COMPANY
Jackson Blvd. & Robey St. Chicago, Ill.
U. S. Metal & Manufacturing Co. 165 Broadway, New York City, N.Y.

STERLING
Insulating Varnishes and Compounds
HIGHEST GRADE STANDARD OF QUALITY
Clear and Black Air Drying Insulating Varnishes
Clear and Black Baking Insulating Varnishes
Oil Proof Finishing Varnishes
Impregnating Compounds
Wire Enamels
FOR THE MANUFACTURER—OPERATOR—REPAIRER
Inquiries invited. Catalogue on request.
We gladly assist in selection.
THE STERLING VARNISH COMPANY
PITTSBURGH, PENNA.
Manchester, England

RAILWAY UTILITY CO.
Sole Manufacturers
"Honeycomb" and "Round Jet" Ventilators
for Monitor and Arch Roof Cars, and all classes of buildings; also
Electric Thermometer Control
of Car Temperatures.
721 W. FULTON ST. Chicago, Ill.
Write for Catalogue
1328 BROADWAY New York, N.Y.

FORD TRIBLOC
A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only Block that carries a five-year guarantee.
FORD CHAIN BLOCK & MFG. CO.
142 Oxford Street, Philadelphia

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.

THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

This is the hub bearing of a HENSLEY Trolley Wheel after the rim is worn out.

HENSLEY Wheels require no bushing and maintain a perfect bearing in the hub until ready to be scrapped.

Our new catalog explains the merits of HENSLEY Wheels.

Our trial proposition proves these merits.

Hensley Trolley & Mfg. Co.
Detroit, Mich.

FOR SALE

MOTOR CAR. Length, 45 ft. Width, 7 ft. 6 in. Height, 12 ft. Cast steel wheels. Equipped with four (4) G. E. 57 motors, hand brakes and Westinghouse air brake equipment.

TRAILER CAR. Length, 36 ft. Width, 8 ft. Double truck. Wheel base, 6 ft. 6 in. Cast steel wheels. Equipped with hand brakes only.

Both cars in excellent condition; have been very little used.

HANOVER & McSHERRYSTOWN STREET RAILWAY CO.
HANOVER, PA.

International Specialties Talk for Themselves

Money-counting fare boxes; Coin and metal ticket counting fare boxes; Coin registers; Coin and transfer registers; Coin, metal ticket and transfer registers; Motor-driven registers; Round and square registers; Badges; Punches and Bell cord.

THE INTERNATIONAL REGISTER CO.
15 South Throop St., Chicago

"Watch Your Step"

If it has
Universal Safety Tread
on it,
Proceed in Safety.
If Not,
Be Careful

Universal Safety Tread Co., Waltham, Mass.
New York Philadelphia Chicago

PROVIDENCE **H-B**
FENDERS LIFE GUARDS

The Consolidated Car Fender Co., Providence, R. I.
Manufacturers of The Providence Fender and H-B Life Guard
Wendell & MacDuffie Co., 61 Broadway, New York
General Sales Agents

For the Answer to your Fare Collection Problems
Write for
"Earnings Per Passenger Mile"
It tells how the
BONHAM TRAFFIC RECORDER
Will Meet Your Needs
The Bonham Recorder Co., Hamilton, Ohio

Saved from the Ashes as many tickets are, means nickels lost to you. Avoid the risk.

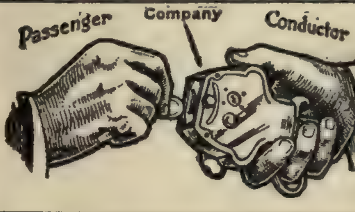
Patten Ticket Destroyer is used right in the office under the eyes of trustworthy employes.

It mutilates beyond redemption.

Scrap sold will pay for the machines.

Ask us for Circular J.

PAUL B. PATTEN CO.
78 Lafayette St., Salem, Mass., U. S. A.



Direct Automatic Registration By the Passenger

Rooke Automatic Register Co.
Providence, R. I.

ELECTRIC RAILWAY DEVICES

Rectifier for Frozen Air Pipes.
High Power Compact Hand Brakes, Gear or Differential Types.
Sterling Light Weight Roller Bearing Trolley Bases.
Screenless Air Cleaners for Compressors
Sterling Sand Boxes.
Berg Fenders and Wheel Guards.
Multi-Vapo-Gap Lightning Arresters and Hydrogrounds.
Trigger Lock Reversible Controller Fingers.
"Q-P" Trolley Catchers.
Soldered Rail Bonds.
Friction and Insulating Tapes.
Sterling Ticket Punches.
Controller Handles.

LORD MFG. CO.,
105 W. 40th St., New York

SEARCHLIGHT SECTION

FOR SALE

We offer for immediate sale and acceptance thirty (30) car sets for double ended cars, Root No. 1 Track Scrapers.

W. R. Kerschner Company, Inc.
50 Church Street, New York, N. Y.

---

600 Kilowatt 60 Cycle Rotary Converter

We offer for immediate shipment 1 600 KW. Westinghouse Rotary Converter for Railway work. 3 ph., 60 cy., 370 v. A.C., 575 v. D.C., speed 600 rpm.

We also have the following transformers that will be sold with or without the above rotary as might be desired:

4—125 KW. Westinghouse oil cooled transformers, 15,000 v. primary, 370 v. secondary.

200 Kilowatt 60 Cycle Rotary Converters

2—200 KW. Westinghouse, 3 ph., 60 cy. rotary converters, 370 v. A. C., 575 v. D. C., 720 rpm., with starting motors, also transformers if desired.

150 Kilowatt 60 Cycle Rotary Converters

2—150 KW. Westinghouse 3 phase, 60 cycle rotary converters, 550 volts, 273 amps., 720 r.p.m., complete with 4—100 KW. Westinghouse Scott connected oil insulated transformers, 10,000/9500 volts prim., 430/362 volts secy.

150 Kilowatt 25 Cycle Rotary Converters

2—150 KW. General Electric type T. C., 4-150-750, 25 cycle, 3 phase, 575 volt, rotary converters, 750 r.p.m., complete with end play and speed limit device.

Railway Motors

2—75 to 90 HP. Westinghouse No. 112 Railway Motors, newly rewound, practically new.

IMMEDIATE DELIVERY

ARCHER & BALDWIN
114-118 Liberty Street New York City
TELEPHONE 4337-4338 RECTOR

MACGOVERN AND COMPANY
INC.

FRANK MACGOVERN, Pres. & Gen. Mgr.
114 LIBERTY STREET NEW YORK CITY
'Phone, 3375-3376 Rector

60 CYCLE ROTARY CONVERTERS

1 1000 KW. Gen. Elec., type HC, form P, 6 phase, 1667 amps., 600 volts D.C., 360 R.P.M.
2 300 KW. Gen. Elec., type HC, form P, 6 phase, 500 amps., 550 volts D.C., 900 R.P.M., with end play and speed limit device.
1 200 KW. Westinghouse, 3 phase, 600 volts D.C., 900 R.P.M., with starting motor.

550 VOLT DIRECT CURRENT UNIT

300 KW. Westinghouse, 550 volt, 145 R.P.M., dir. conn. to 16½" and 30½" x 30" Buckeye tandem engine.

Immediate Delivery

THIS IS OF NECESSITY ONLY A PARTIAL LIST—SEND FOR CATALOG

MOTOR WANTED

One—375 to 500 H.P., 440 volt, 3 phase, 60 cycle, 3 bearing, with sub-base and rails. Speed not over 580 r.p.m. Slip ring type for use with external resistance. Must be guaranteed for continuous duty at full load. Give full details in first letter.

Cape Girardeau Portland Cement Co.
Cape Girardeau, Mo.

CARS FOR SALE

OPEN and CLOSED
MOTOR and TRAIL
Write for Price and Full Particulars to
ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

COMPLETE ARMATURES FOR SALE

FOR ALL THE STANDARD
STREET RAILWAY MOTORS
GET OUR PRICE WE CAN SAVE YOU MONEY
America's Greatest Repair Works
CLEVELAND ARMATURE WORKS, Cleveland, O.

Get Your Wants into the Searchlight

SEARCHLIGHT SECTION

FOR SALE

A Metal Opportunity

Take advantage of the high prices of metal. We are cash buyers of all grades of scrap metal. Our specialty is buying electric plants, storage battery plants, storage battery plates and sediment. We buy small lots as well as large lots. Write us and tell us what you have and we will be pleased to quote you prices. National Metal & Rubber Co., 30-31 India Wharf, Boston, Mass.

Engine for Sale

One horizontal McIntosh & Seymour tandem compound condensing engine, 11 in. and 20 in. x 30 in., 240 I.H.P., at one-third cut off; 300 I.H.P. at one-half cut off; 125 lb. steam pressure; 26 in. vacuum. Flywheel, weight 13,000 lb.; 32 in. face, 11 ft. diam. This engine is in first class operating condition and could be shipped immediately. The American Railways Company, Witherspoon Bldg., Philadelphia.

550 Volt Generator for Sale

1—Fort Wayne, 150 kw, belted Railway Generator, in good condition, compound wound, 500-550 v., 6 p., 550 r.p.m., type M.P.L., form IB. Immediate shipment and very attractive price. F.o.b. Cambridge, Ohio. Write Ohio Service Co., Coshocton, Ohio.

Generating Set for Sale

1—300 hp. Buckeye tandem compound engine 14¼" and 25 x 21", 20" stroke, 200 r.p.m., non-condensing, capable of developing 35% in excess of this capacity, direct connected to a 3-phase, 200 kw., 60 cycle General Electric generator. This generating set is in good condition. Immediate shipment can be made. If interested, address Morden Frog & Crossing Works, 208 South La Salle Street, Chicago.

D. C. Generators for Sale

1—100 Kw. 125-250 v. D.C. 3-wire Crocker-Wheeler generator set consisting of two 50 kw. generators, direct connected to a 150 hp Fleming-Harrisburg center-crank single cylinder engine good for 50% unbalancing. Both generators on same side of engine. Can be operated on greatly unbalanced 3-wire 125-250 v. system or on straight 2-wire 125 v. or 250 v. system.

1—200 kw. set same as above.

1—200 kw. 230 v. D.C. 500 r.p.m. Jenny belted generator with pulley, base and rheostat.

Standard Electric & Elevator Company,
123 S. Calvert St., Baltimore, Md.

NEW RAILS

Approximately 450 tons New No. 1 Open Hearth 60 lb. Steel Rails for immediate shipment from stock. Also 2000 tons 56 to 70 lb. First Quality Relayers.

FOX BROS. & CO.
126 Lafayette St., New York, N. Y.

For Sale

10 miles 70 lb. rail with joints. Has had but little use and is in first class condition. Fort Dodge, Des Moines & Southern Railroad Company, Boone, Iowa.

RAILS

75 Tons 80 lb.
600 Tons 68 lb.
400 Tons 60 lb.
650 Tons 58 lb.
100 Tons 56 lb.
1200 Tons 52 lb.
50 Tons Girder Rails
20 Tons Flat Rails

OR ANY SECTION—NEW OR RELAY

Before buying
LOCOS., CARS, EQUIPMENT, MACHINERY, TANKS
See what Bargains can be obtained from

ZELNICKER IN ST. LOUIS

428 First Nat. Bk., Chicago
910 Hennen Bldg., New Orleans

Get your Wants into the Searchlight

ADVERTISING RATES

Positions Wanted, Evening Work Wanted, 2 cents a word, minimum charge 50 cents an insertion, payable in advance.

Positions Vacant, Salesmen Wanted, Agencies, all undisplayed Miscellaneous ads, Machinery and Plants For Sale (with one line of display heading), 3 cents a word, minimum charge $1.50 an insertion.

All advertisements for bids cost $2.40 an inch.

Advertisements in display type cost as follows for single insertions:

1-16 page,	$5.00	1 in. single col.,	$3.00
1-8 page,	10.00	4 in. single col.,	11.60
1-4 page,	20.00	8 in. single col.,	22.40

In replying to advertisements, send copies of testimonials, etc., instead of originals.

MISCELLANEOUS WANTS

Motors Wanted

We are in the market for several A.C. and D.C. motors, and also some plating dynamos, any size or make. Write us what you have to offer. Schwartz & Land, 207 Centre St., New York City.

Electricians and Armature Winders

Send $1 for 14 blue prints of motor windings, 10 A.C., single, two and three phase and 4 D.C. or set of 20 A.C., 4 D.C. and 4 rotary converter drawings, $1.60. Winding made easy. Martin Elec. Co., 329 Irvington Place, Denver, Colo.

Want Immediately

20 Westinghouse, type 12-A, 30 hp. railway motors, to be in serviceable condition, equipped with armature, axle bearings. Immediate delivery ESSENTIAL. Quote price.

Box 1260, Electric Railway Journal,
1570 Old Colony Bldg., Chicago, Ill.

BUSINESS OPPORTUNITIES

Corporation Requires Financing

Public utility corporation requires financing. Opening for a man, firm or banking concern with knowledge of handling securities of power, light, traction and freight properties and engineering reports. Must control capital and be ready to assume active interest in the company. Full particulars to *principals only*. References required. Box 1233, Elec. Ry. Jour., 935 Real Estate Trust Bldg., Philadelphia, Pa.

POSITIONS WANTED

EXPERIENCED freight man wants position as general freight agent or manager of freight department. Excellent reasons for desiring change. Box 1248, Elec. Ry. Jour.

GENERAL manager electric railway and lighting properties open for position. Twenty years' experience handling properties for large banking concern. Box 1236, Elec. Ry. Jour., 935 Real Estate Trust Bldg., Philadelphia, Pa.

LINE foreman construction or maintenance, 15 years' experience D.C. and A.C. Catenary construction, good references. Will go anywhere. Married and strictly sober. Box 1257, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

MASTER mechanic, 10 years' experience electrical and mechanical, with large interurban road. Open for position as master mechanic, electrical engineer or assistant. Box 1249, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

POSITIONS WANTED

POSITION as superintendent or assistant to general manager. Have had 18 years' experience on electric and steam roads as inspector, dispatcher, assistant superintendent, etc. Am now employed on one of the largest interurban and city lines. Am able to install safest system of dispatching. Best of reference as to ability, character, etc., from present employer. Box 1243, Elec. Ry. Jour.

PUBLICITY man, just the kind suggested in the series of publicity editorials now running in this publication is open for new engagement. Experience covers 4 years' publicity writing for big corporation and 6 years of newspaper work. Now in New York State, but willing to locate anywhere. Box 1265, Elec. Ry. Jour.

PURCHASING agent, age 32, married, 10 years with one of the largest street railways in the United States; now filling this capacity in the automobile industry; desires to return to the traction field. Thoroughly familiar with modern purchasing methods. Salary $2,000. Box 1241, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT wants position as Transportation or General Freight and Passenger Agent, or both. Forty-eight years old. Twenty years' experience. Box 1262, Elec. Ry. Jour.

SUPERINTENDENT of city and interurban lines, now employed, wishes same position with larger property. Best of reference furnished. Box 1266, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

YOUNG man, six years in executive offices large Eastern street railway and lighting company. Now law clerk legal department. College graduate; member of bar. Can handle legal and claim work. Good assistant to busy executive. Box 1223, Elec. Ry. Jour., 935 Real Estate Trust Bldg., Philadelphia, Pa.

POSITIONS VACANT

A LARGE street railway company in the Eastern States desires an operating superintendent to take charge of a division employing 200 blue uniform men. State full qualifications and terms. Replies will be considered in confidence. Box 1251, Elec. Ry. Jour.

A LARGE Eastern electric railway system desires the services of a high grade man to handle public relations and publicity work. State full qualifications and terms. Replies strictly confidential. Box 1252, Elec. Ry. Jour.

ASSISTANT railway superintendent wanted for system operating twelve cars in Southwestern city of 25,000 people. Box 1255, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

EXPERIENCED cost and quotation clerk wanted, electrical supply house. State age, experience, salary. Box 1259, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

GENERAL superintendent wanted for 40 car city road; a man with practical experience and executive ability who has been successful in former positions. Give personal history and business experience. State salaries earned. Box 1256, Elec. Ry. Jour.

SPECIAL track work draftsman wanted. State lowest salary. Address Chief Engineer, The Buda Company, Harvey, Ill.

AGENTS AND SALESMEN

Salesman Wanted

Reliable and successful salesman wanted, to handle solder, babbitt metal lead pipe and other white metal alloys reaching the railroad purchasing department and supply trade as a side line on commission basis. For full particulars apply to Roland W. Dennis, 736 East 14th St., New York City.

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

More than 300 different products are here listed.
The Alphabetical Index (see eighth page following) gives the page number of each advertisement.
As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.
If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will promptly furnish the information.

Acetylene Apparatus. (See Cutting Apparatus, Oxy-Acetylene.)

Acetylene Service.
Prest-O-Lite Co., Inc.

Advertising, Street Car.
Collier, Inc., Barron G.

Air Cleaners.
Lord Mfg. Co.

Air Rectifiers.
Lord Mfg. Co.
National Safety Device Co.

Alloys and Bearing Metals. (See Bearings and Bearing Metals.)

Alloys, Steel and Iron.
Titanium Alloy Mfg. Co.

Anchors, Guy.
Electric Service Supplies Co.
Holden & White.
Johns-Manville Co., H. W.
Ohio Brass Co.
Union Electric Co.
Westinghouse Elec. & M. Co.

Automobiles and Buses.
Brill Co., The J. G.

Axle Straighteners.
Columbia M. W. & M. I. Co.

Axles, Car Wheel.
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Cincinnati Car Co.
St. Louis Car Co.
Standard Steel Works Co.
Westinghouse Elec. & M. Co.

Babbitting Devices.
Columbia M. W. & M. I. Co.

Badges and Buttons.
Electric Service Supplies Co.
International Register Co., The

Bankers and Brokers.
National City Co.
Redmond & Co.

Batteries, Dry.
Johns-Manville Co., H. W.

Batteries, Storage.
Electric Storage Battery Co.

Bearings and Bearing Metals.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
More-Jones Brass & M. Co.
St. Louis Car Co.
Westinghouse Elec. & M. Co.

Bearings, Center.
Baldwin Locomotive Works.

Bearings, Roller and Ball.
Gurney Ball Bearing Co.
Railway Roller Bearing Co.

Bearings, Roller Side.
Holden & White.

Bells and Gongs.
Brill Co., The J. G.
Electric Service Supplies Co.
St. Louis Car Co.

Benders, Rail.
Niles-Bement-Pond Co.
Zelnicker Sup. Co., W. A.

Blow Torches for Soldering and Brazing. (See Cutting Apparatus, Oxy-Acetylene.)

Blowers.
General Electric Co.
Westinghouse Elec. & M. Co.

Boilers.
Babcock & Wilcox Co.

Boiler Cleaning Compounds.
Dearborn Chemical Co.
Johns-Manville Co., H. W.

Boiler Coverings.
Johns-Manville Co., H. W.

Bond Clips.
Electric Railway Improve. Co.

Bond Testers.
American Steel & Wire Co.

Bonding Apparatus.
Electric Railway Improve. Co.
Ohio Brass Co.
Prest-O-Lite Co., Inc.

Bonding Tools.
American Steel & Wire Co.
Electric Railway Improve. Co.
Electric Service Supplies Co.
Ohio Brass Co.

Bonds, Rail.
American Steel & Wire Co.
Electric Railway Improve. Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Ohio Brass Co.
Union Electric Co.
Westinghouse Elec. & M. Co.

Bonds Welded.
Lincoln Bonding Co.

Book Publishers.
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel.
Niles-Bement-Pond Co.

Braces, Rail.
Kilby Frog & Switch Co.

Brackets and Cross Arms. (See also Poles, Ties, Posts, Etc.)
American Bridge Co.
Bates Expanded Steel Truss Co.
Electric Service Supplies Co.
Int'l Creosoting & Constr. Co.
Lindsley Bros. Co.
Ohio Brass Co.
Union Electric Co.

Brake Adjusters.
Holden & White.
Smith-Ward Brake Co.

Brake Shoes.
Amer. Brake Shoe & Fdy. Co.
Barbour-Stockwell Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Long Co., E. G.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Holden & White
Long Co., E. G.
Lord Mfg. Co.
National Brake Co.
National Safety Device Co.
St. Louis Car Co.
Westinghouse Trac. B. Co.

Bridges and Buildings.
American Bridge Co.

Brooms, Track, Steel or Rattan.
Paxson Co., J. W.
Zelnicker Sup. Co., W. A.

Brush Holders.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Brushes, Carbon.
Dixon Crucible Co., Jos.
General Electric Co.
Jeandron, W. J.
Morgan Crucible Co.
Westinghouse Elec. & Mfg. Co.

Bumpers, Car Seat.
Electric Service Supplies Co.

Bunkers, Coal.
American Bridge Co.

Bunting.
Boyle & Co., Inc., John.

Bushings, Case Hardened and Manganese.
Bemis Car Truck Co.

Bushings, Fibre.
Diamond State Fibre Co.

Buttons. (See Badges and Buttons.)

Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.)

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc.—(See those headings.)

Car Trimmings. (For Curtains, Registers, Doors, Seats, etc., see those headings.)

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cincinnati Car Co.
Jewett Car Co.
Kuhlman Car Co., G. C.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Second Hand.
Electric Equipment Co.

Cars, Self-Propelled.
Electric Storage Battery Co.
General Electric Co.

Car Stops, Automatic.
Consolidated Car-Heating Co.

Castings, Brass.
Frankel Connector Co.
More-Jones Brass & M. Co.

Castings, Composition or Copper.
Anderson Mfg. Co., A. & J. M.

Castings, Gray Iron and Steel.
Amer. Brake Shoe & Fdry. Co.
American Bridge Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Long Co., E. G.
St. Louis Car Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.

Castings, Malleable and Brass.
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Long Co., E. G.
St. Louis Car Co.

Catchers and Retrievers, Trolley.
Electric Service Supplies Co.
Holden & White.
Long Co., E. G.
Lord Mfg. Co.
Ohio Brass Co.
Union Electric Co.
Wood Co., Chas. N.

Ceiling, Car. (See Headlining.)

Charging Sets, Storage Battery.
General Electric Co.

Cheese Cloth.
Boyle & Co., Inc., John.

Chemists.
Little, Inc., Arthur D.

Circuit Breakers.
Cutter Electrical & Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Clamps.
Frankel Connector Co.

Clamps and Connectors for Wires and Cables.
Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co.
Frankel Connector Co.
General Electric Co.
Klein & Sons, Mathias.
Ohio Brass Co.
Union Electric Co.
Westinghouse Elec. & M. Co.

Cleaners and Scrapers, Track. (See also Snow - Plows, Sweepers and Brooms.)
Brill Co., The J. G.
Cincinnati Car Co.
Ohio Brass Co.
Root Spring Scraper Co.

Cleats, Car Wiring.
General Electric Co.

Clusters and Sockets.
General Electric Co.

Coal and Ash Handling. (See Conveying and Hoisting Machinery.)

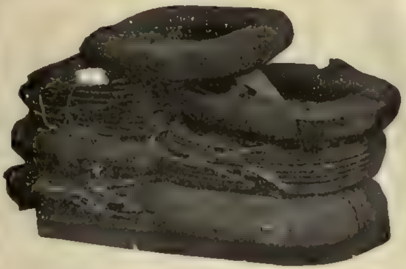
Coasting Clocks.
Railway Improvement Co.

Coil Banding and Winding Machines.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Coils, Armature & Field.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Independent Lamp & Wire Co.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coin-Counting Machines.
International Register Co., The
Johnson Fare Box Co.



Every
Penny
Saved

from operating expenses, is just so much gained for the dividend account. Save money, and increase your dividends by using the

Independent Treatment
Of Old Field Coils

You pay us the trifling cost of the insulation and we'll return to you for every old coil a coil equal to and in most cases better than a new coil. A coil that reflects skilled labor, up-to-date equipment and that degree of perfection that only comes through doing one thing for ever so long and doing it well.

And don't forget the insulation we use is Salamander Pure Asbestos—a guarantee of long life and dielectric strength.

Correspondence Solicited.

Independent Lamp & Wire Co., Inc.

Offices:
1737 Broadway, New York

FACTORIES:
York, Pa., and Weehawken, N. J.

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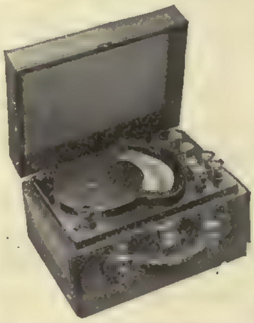

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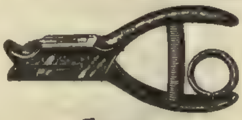

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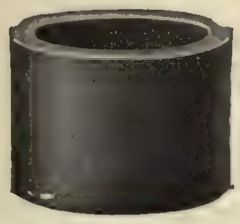

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Changes of copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for OK before publication.

New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.

If proofs before printing are required, change of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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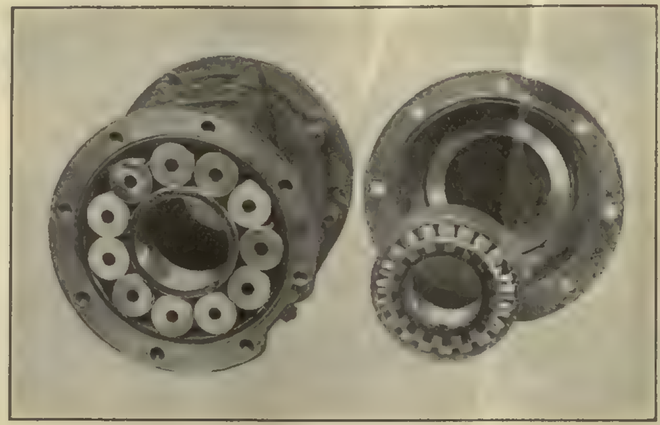

PARTS OF ROLLWAY BEARING

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When the Empire United Railways, Inc., Syracuse, N. Y., as you saw in Messrs. Voth and Metcalfe's article of May 6, wanted to know the honest-to-goodness facts about

Rollway Bearings

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	Plain Bearings	Roller Bearings
Annual mileage	103,446	103,446
Energy consumption, kilowatt-hours	372,405	327,717
Energy cost, at 1 cent per kilowatt-hour	$3,724.05	$3,277.17
Cost of oil	10.35	1.04
Cost of waste	4.14	....
Cost of rebabbitting, labor and material	10.36	....
Cost of labor for oiling	8.27	0.52
Cost of labor replacing oil every 1000 miles	3.11	....
Total annual cost	$3,760.28	$3,278.73

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The saving in one year was $481.45; the cost of the Rollway Bearings was only $434.00.

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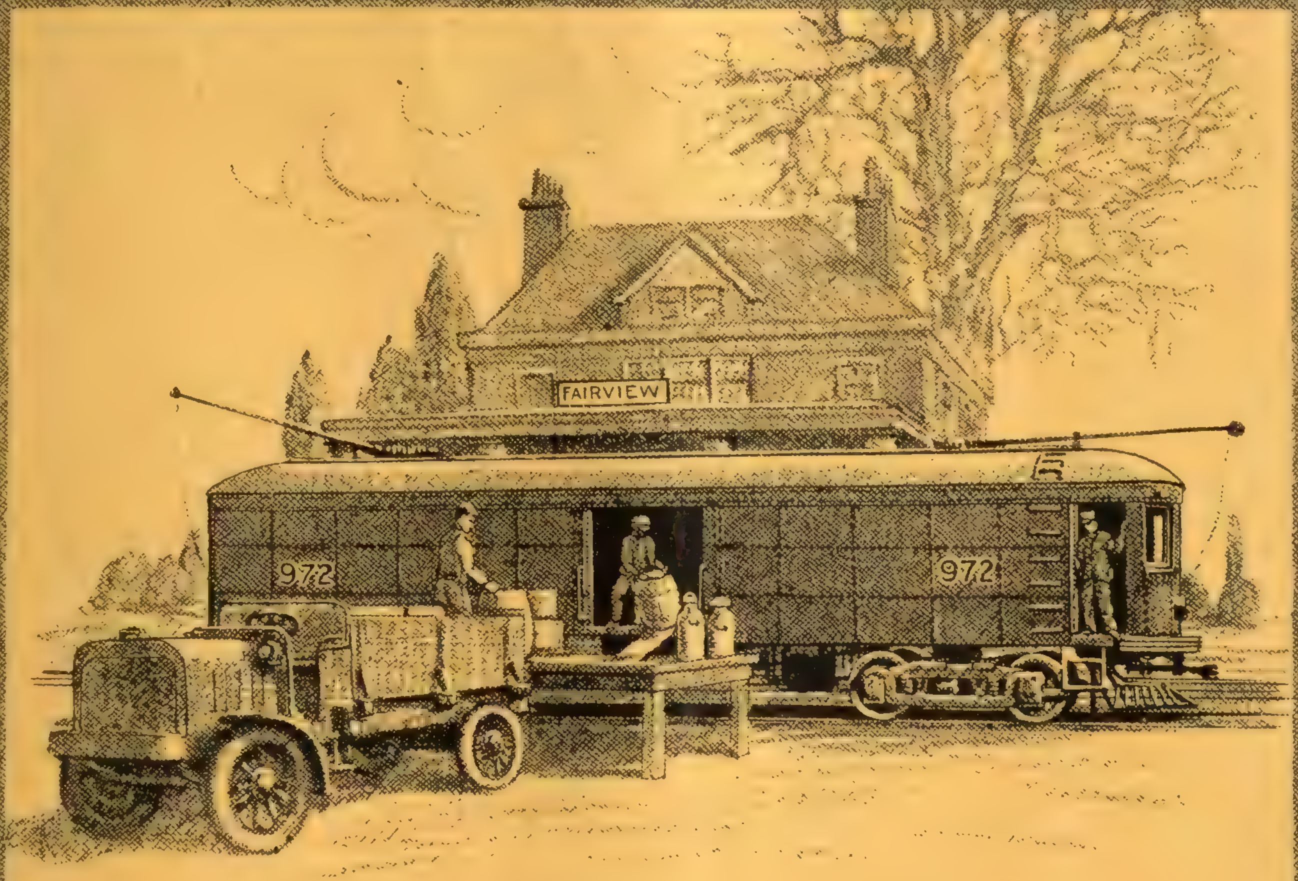

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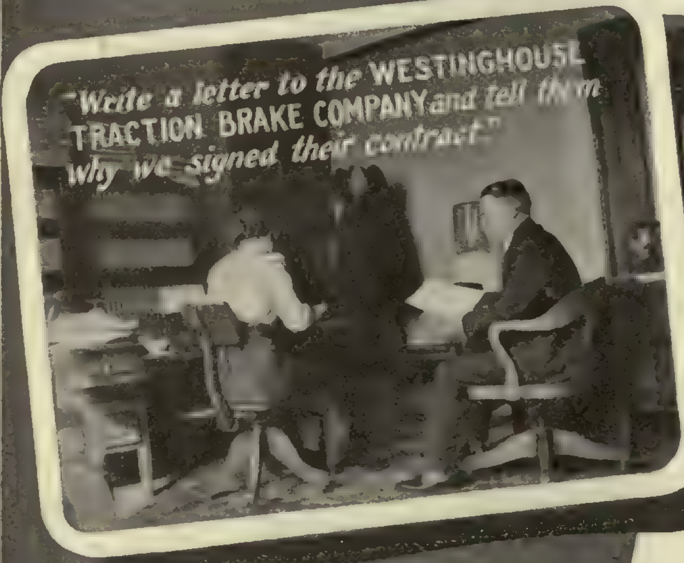
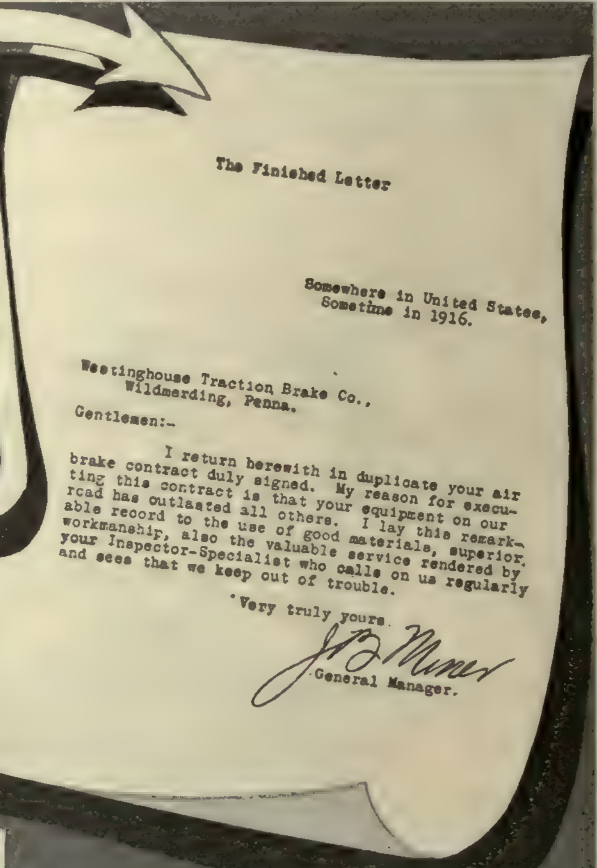

"Write a letter to the WESTINGHOUSE TRACTION BRAKE COMPANY and tell them why we signed their contract."



The Finished Letter

Somewhere in United States,
Sometime in 1916.

Westinghouse Traction Brake Co.,
Wildmerding, Penna.

Gentlemen:-

I return herewith in duplicate your air brake contract duly signed. My reason for executing this contract is that your equipment on our road has outlasted all others. I lay this remarkable record to the use of good materials, superior workmanship, also the valuable service rendered by your Inspector-Specialist who calls on us regularly and sees that we keep out of trouble.

Very truly yours.

J. B. Miner
General Manager.

This is one of a number of Westinghouse Air Compressors installed in June 1907, having made approximately 980000 miles, costing little for repairs, and is still running strong and efficiently. Best materials, superior workmanship and Inspector-Specialist Service did it.

Westinghouse Traction Brake Company

General Offices: Wilmerding, Pa.

PITTSBURGH
Westinghouse Building
CHICAGO
Railway Exchange Building

NEW YORK
City Investing Building
ST. LOUIS
Boatmen's Bank Building

The Choice of a Stoker
Always Narrows down to -
-A Study of Plant Requirements

WESTINGHOUSE ELECTRIC

This Time Overfeed!

"I like your smile," said the Sales Manager to Sam, the Stoker Expert. "What is new?"

"Another sale," answered Sam. "This time eight overfeeds to burn what I actually believe is the worst coal the Pittsburgh District can produce—high in volatile, with big possibility of clinker."

"But, Sam, how about the Underfeed? It would have done the trick."

"That is true, but the purchaser did not require the overload or reserve capacity our Underfeed would give him, so we saved him this extra in first cost—although I grant you that where heavy overloads are encountered, the additional cost of the Underfeed is fully warranted."

"You are right, Sam."

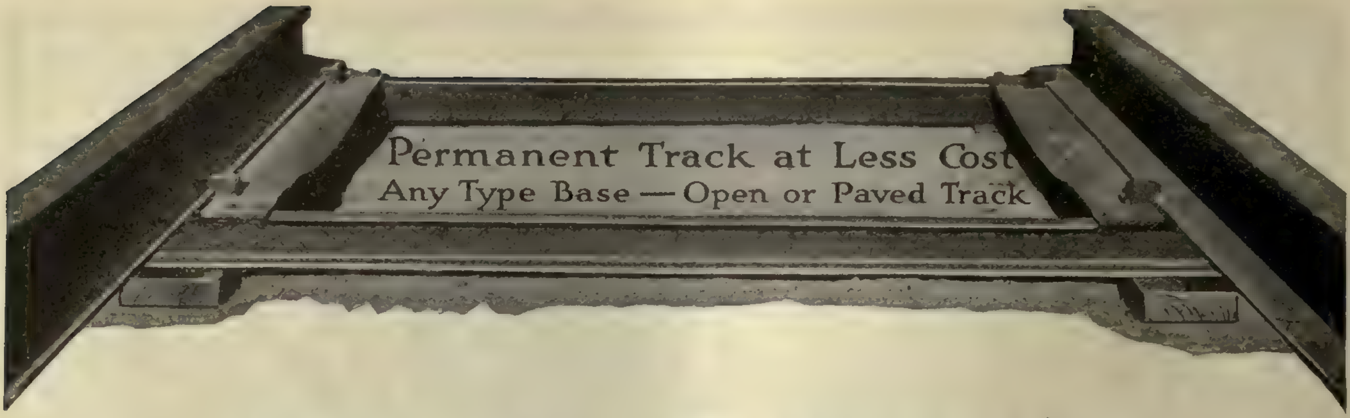
"So, after considering the purchaser's requirements from every angle, we decided that the overfeed—which, as you know, will burn almost any kind of fuel satisfactorily—was the stoker to recommend."

"Well, Sam, I like the way you handle these jobs, and I am pleased that with our three types we are able to meet the customer's requirements so closely. The one-stoker man certainly must be under a serious handicap."

Write for Circular W.M 513

Westinghouse Electric & Manufacturing Co.
EAST PITTSBURGH, PA.

Westinghouse

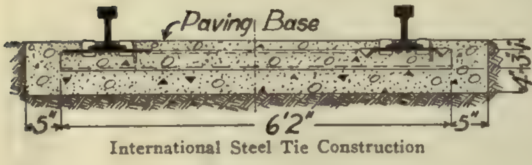

Permanent Track at Less Cost
Any Type Base — Open or Paved Track

INTERNATIONAL

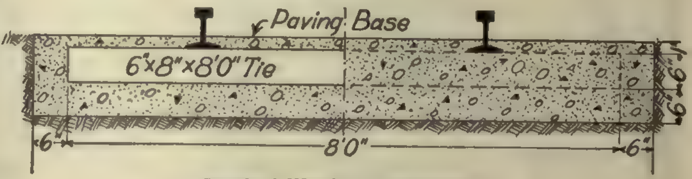
STEEL TWIN TIES

33% to 60% Saving in Labor

Here are two standard track sections



International Steel Tie Construction



Standard Wood Tie Construction

Note that International Ties require an excavation 7 feet wide and 14 inches deep. Wood tie construction requires an excavation 9 feet wide and 19 inches deep.

There's a saving of 40% in favor of International Ties! And remember that in city street work you tear up 2 feet less pavement for International Steel Ties than you do for wood ties. Per mile of track there are required but ⅓ as many International Twin Ties as wood ties—to do the same work. Two men place and block up an International Tie as easily as a wood tie.

Another labor saving of 66% in favor of International Ties.

Eight steel clips wedged into the plate holes are required to fasten an International Tie with a big factor of safety. To fasten rails to three wood ties requires 12 driven spikes.

Still another labor saving of at least 50% in favor of International Steel Ties!

Labor in these days of uncertainty and high prices is a mighty grave problem for the man who builds track.

Cut that problem in half by using International Steel Twin Ties.

Let us submit comparative estimate for your job.

The International Steel Tie Company

General Sales Office and Works: Cleveland, Ohio

REPRESENTATIVES:

Western Eng'g Sales Co., San Francisco, Cal.
Los Angeles, Cal. Seattle, Wash.

R. J. Cooper Co.,
Salt Lake City, Utah.

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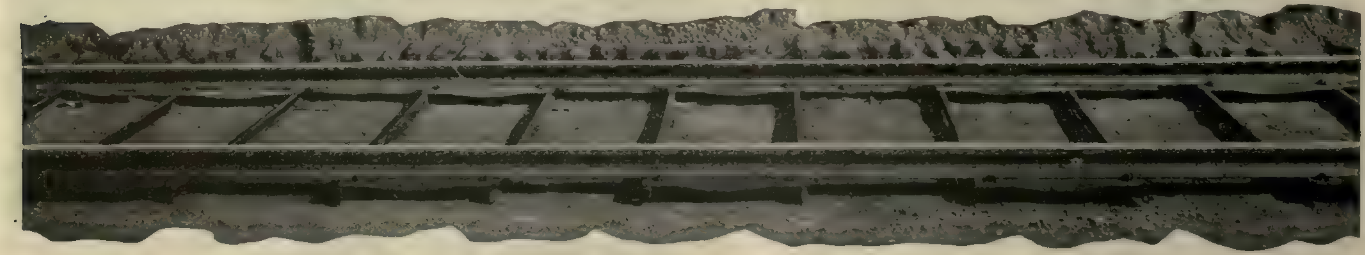
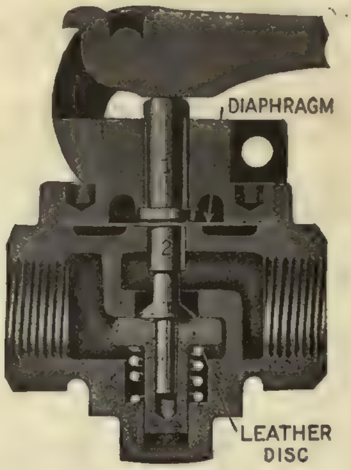
Dallas, Texas.

Maurice Joy,
Philadelphia.

William H. Ziegler,
Minneapolis, Minn.



O-B Form 1 Diaphragm
Valve Patented



Sectional View

Conserve the Air

Don't tolerate a Sander Valve that uses part of the air for sanding and sends the rest shooting up around the stem.

It isn't necessary because you can get an O-B Diaphragm Sander Valve.

In this valve the plunger is made in two pieces, separated by a flexible, metal diaphragm.

This diaphragm does not interfere with the easy operation of the valve but it does prevent the escape of the air.

When the motorman presses down on the handle, all the air is used for applying the sand.

O-B Air Sander Equipment is listed on Pages 587-592 of Catalog No. 16.

The Ohio Brass Co.
Mansfield, Ohio

"The technical or trade journal of today is the livest, most 'up-to-now' assistant that the public utility man has" —says H. S. COOPER, secretary Southwestern Electrical & Gas Association, on the reading of technical journals.

He further says:

"It is the Always Ready Reference of the minute, and the officer, official, head of department, or even workman, who does not use it is neglecting one of his best friends!

"Now, I am not soliciting subscriptions for any trade or technical publication; I am not interested financially in any of them; my only interest in their use is that I have not only found them of immense value in all the businesses which I have managed, but I have yet to find a real up-to-date, hustling, successful manager or head of department who does not promptly and fully read his technical and trade publications, note and file the matter that interested him or was or would be of use to him in his business. * * * And in no other way can any operative, no matter how high or low his position, keep so fully abreast of the times in his business as by early and careful perusal of his trade and technical periodical from its front to its back cover. And from no other source can he obtain the immediately useful as he can from a well-filled and indexed present volume of those same publications.

Those who have tried this know that the above is the truth. Let those who have not tried it **give it a trial for six months or a year** and they will thank me for calling their attention to this matter!"

Here's the COUPON that will bring it—the Electric Railway Journal— to *you* on trial!

ELECTRIC RAILWAY JOURNAL
239 West 39th Street, New York

....

You may enter my subscription for the Electric Railway Journal for one year.

Cross out one of these lines
I enclose $........ herewith.
I agree to send $........ not later than...............
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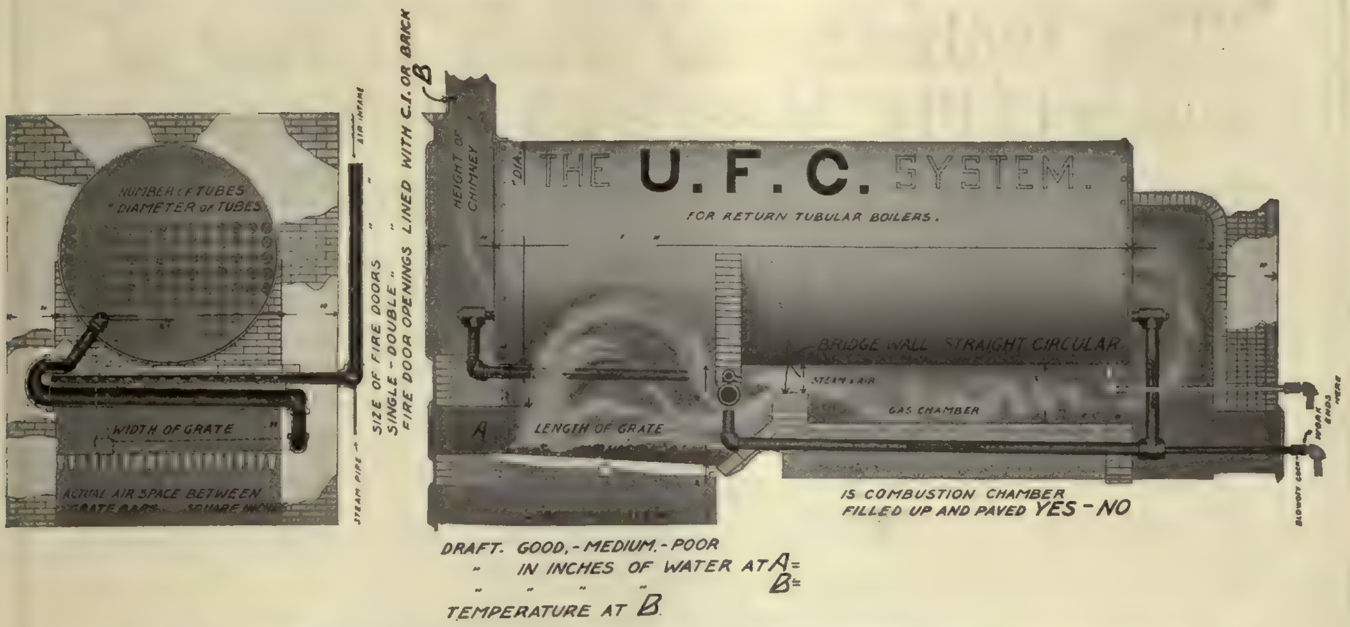
Abolish the Smoke Nuisance—


NUMBER OF TUBES
" DIAMETER OF TUBES
WIDTH OF GRATE
ACTUAL AIR SPACE BETWEEN GRATE BARS SQUARE INCHES
STEAM PIPE
AIR INTAKE
SIZE OF FIRE DOORS
SINGLE - DOUBLE
FIRE DOOR OPENINGS LINED WITH C.I. OR BRICK
B
HEIGHT OF CHIMNEY
DIA.
THE U. F. C. SYSTEM.
FOR RETURN TUBULAR BOILERS.
BRIDGE WALL STRAIGHT CIRCULAR
STEAM & AIR
GAS CHAMBER
A
LENGTH OF GRATE
IS COMBUSTION CHAMBER FILLED UP AND PAVED YES - NO
WORK ENDS HERE
BLOWOFF COCK
DRAFT. GOOD,- MEDIUM.- POOR
" IN INCHES OF WATER AT A=
B=
TEMPERATURE AT B.

Raise More Steam With Cheaper Coal

by equipping your boilers with

The U. F. C. System

Adapted for both return tubular and water tube boilers. Insures the maximum efficient combustion of the cheapest grades of fuel without smoke. Greatly assists in maintaining a free circulation of the water and lessens the tendency to scale.

Installed in many representative plants. In **every** case repeat orders followed after the first boiler had been equipped.

The Mean Result of 50 Boiler Tests—

conducted by the owners.

	Plain Furnace	U. F. C. System
Cost of coal per ton	$3.56	$3.56
Coal per horsepower hr.	4.137 lb.	3.12
Per cent of ashes	15.81	13.61
Efficiency (B.T.U. Utilized)	62.23	80.22
Hp. on basis 34½ lb. coal per hour from and at 212 deg.	111.82	135.77
Cost of evaporating 1000 lb. water from and at 212 deg.	20.79c	14.63c

This average result shows that the U. F. C. System saved 22.63% of coal and at the same time evaporated 30.28% more water.

We Positively Guarantee—

A minimum saving of 10% in fuel for return tubular boilers.

Increased boiler capacity.
Elimination of the smoke nuisance.
Less scale formation.
Increased draft.

Write Us for Complete Details Now

UNITED FURNACE CORPORATION

NEW YORK
120 Broadway

PHILADELPHIA
Harrison Building

BALTIMORE
Second and Toone Sts.

THE SIGNIFICANCE TO *YOU* OF THE MEMBERSHIP OF THE

Electric Railway Journal

IN THE ASSOCIATED BUSINESS PAPERS, INC.

YOU depend upon the Electric Railway Journal for an unbiased and accurate report of all news affecting your business interests.

Probably, too, you give heed to its editorial counsel in many matters of considerable consequence. You have a right therefore, to know about the policies and principles back of the important service rendered by the Electric Railway Journal.

The membership of this publication in the Associated Business Papers, Inc. (the International Association of Class, Trade and Technical Papers), means that it has achieved an exceptionally high publishing standard, and has subscribed unreservedly to these—

STANDARDS OF PRACTICE OF BUSINESS PAPERS

The publisher of a business paper should dedicate his best efforts to the cause of Business and Social Service, and to this end should pledge himself.

1. To consider, first, the interests of the subscriber.
2. To subscribe to and work for truth and honesty in all departments.
3. To eliminate, in so far as possible, his personal opinions from his news columns, but to be a leader of thought in his editorial columns, and to make his criticisms constructive.
4. To refuse to publish "puffs," free reading notices or paid "write-ups"; to keep his reading columns independent of advertising considerations, and to measure all news by this standard: "Is it real news?"
5. To decline any advertisement which has a tendency to mislead or which does not conform to business integrity.
6. To solicit subscriptions and advertising solely upon the merits of the publication.
7. To supply advertisers with full information regarding character and extent of circulation, including detailed circulation statements, subject to proper and authentic verification.
8. To co-operate with all organizations and individuals engaged in creative advertising work.
9. To avoid unfair competition.
10. To determine what is the highest and largest function of the field which he serves, and then to strive in every legitimate way to promote that function.

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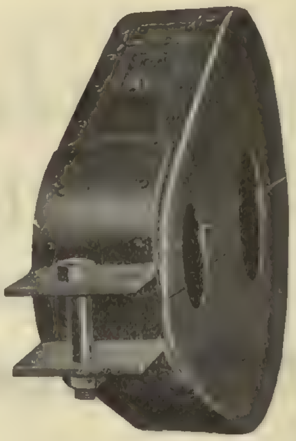
220 WEST 42ND STREET NEW YORK CITY

The Gear Case With a Thousand Refinements— The Keystone



Riveted and Electrically Spot-welded

Typical Keystone Steel Gear Case

Improved Construction Does Not Injure the Steel

The perfect design and construction of Keystone Steel Gear Cases was largely the result of our close co-operation with operating men. The many details of a thousand refinements were then carefully worked out so that today when you buy Keystone Cases you get full advantage of these perfected ideas. You get the best that specialists in gear case construction and modern practice can produce.

Under View of Keystone Gear Case

Inner View of Top Half of Keystone Gear Case

On your next order specify the Gear Case with a thousand refinements—The Keystone.

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Sts.

NEW YORK
50 Church St.

CHICAGO
Monadnock Bldg.

Anderson Slack Adjusters will not lock the wheels when the load leaves the car

Adjustment governed solely by brake shoe wear

With the Anderson Brake Slack Adjusters no definite amount of slack has to accumulate before the adjuster will compensate for it. No excess slack in the brake rigging is too small to operate the adjuster.

It eliminates the possibility of taking up too much slack simply because the car is heavily loaded and then locking the wheels when the load leaves the car. There is nothing in the adjuster to buckle or clog and no attention is required until the brake shoes wear out.

It is an automatic turnbuckle

The Anderson Slack Adjuster is really an automatic turnbuckle. It operates by means of a cone clutch. It is so simple that there is nothing to get out of order and it does the same work *continually* as is ordinarily done periodically by the man in the pit. It reduces pull-ins, makes every car handle alike, saves power and brake shoes.

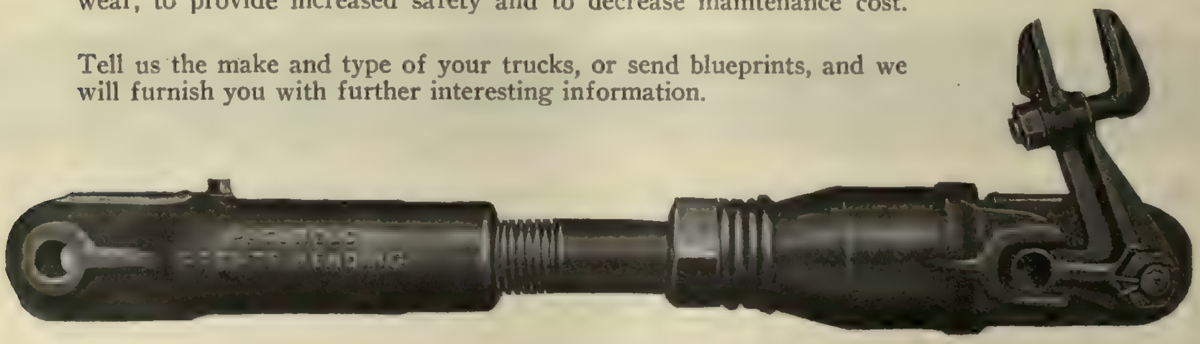
Installed on any car in 15 minutes

The Anderson Adjuster simply takes the place of the usual turnbuckle and can be installed in 15 minutes. It is not necessary to overhaul or change the brake rigging of the car to add this time and money-saver to the car equipment. Once installed no attention is required whatever.

Heat, cold, snow, mud or dirt cannot affect its operation.

Put these slack adjusters on your old cars to reduce shoe and wheel wear, to provide increased safety and to decrease maintenance cost.

Tell us the make and type of your trucks, or send blueprints, and we will furnish you with further interesting information.



Holden & White

General Sales Agents for The Anderson Brake Adjuster Co.

1508 Fisher Building **Chicago, Illinois**

To the man who is interested in signals

For more than fifteen years this company has been prominently identified as a manufacturer of electric railway signals exclusively.

Practically the whole development of automatic signals for electric railways has taken place during this period.

Throughout this time the same management and control and engineering and policy have obtained at the U. S. E. S. Co. plant.

So that the full benefit of this engineering and manufacturing experience is applied to each signal we build—to each application we advise.

It is this stability and permanence that has enabled us to develop a nation-wide business on the sound basis of RELIABILITY in engineering — in manufacturing — in sales methods.

For our mutual benefit your business for automatic electric signals is solicited on this basis.

United States
Electric Signal Co.
West Newton, Massachusetts
Foreign Representatives:
Quilliam Brothers, Cleggs Court,
Chapel Street, Salford, England

14

"AN ANALYSIS OF RAILROAD ACCIDENTS"

Discussing fourteen causes of accidents preventable by a complete signal system. Compiled from Quarterly Accident Bulletins of the Interstate Commerce Commission.

SEND FOR THIS BOOKLET

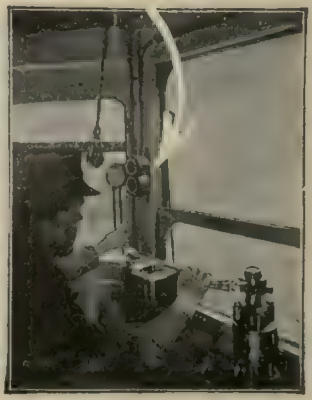
1. Head-on collisions due to neglect of orders by train crew.
2. Head-on collisions due to neglect of orders by manual block signal operators and telegraph operators.
3. Rear-end collisions due to improper flagging (no signal system).
4. Disregard of fixed signals at danger.
5. Open switch.
6. Collisions due to excessive speed.
7. Derailments—due to excessive speed.
8. Derailments—due to broken rail.
9. Head-on collisions due to error of dispatcher.
10. Rear-end collisions due to disregard of flagman (no signal system).
11. Unknown causes (estimated).
12. Engineer dead or sleeping.
13. Disregard of caution signal under permissive movement.
14. Side-swiping accidents (cars not in clear at sidings).

SIMMEN AUTOMATIC RAILWAY SIGNAL CO.

1575 Niagara St., Buffalo, N. Y.

PACIFIC COAST REPRESENTATIVE
W. H. CRAWFORD, 609 Spalding Building
Portland, Oregon

The Simmen System puts the Dispatcher's signal in the Train Operator's cab



Phono-Electric

At New Haven's Famous Green

Huge crowds attended the great pageant which celebrated Yale's two hundred and fiftieth anniversary.

Imagine, if you can, the traffic tangle had there been a failure of the trolley wires at such a congested point as the Green. But power was given to the cars in uninterrupted volume—the trolley wire is Phono-Electric.

Wherever the trolley traffic of a city is concentrated, there is the place to look for Phono-Electric Trolley Wire—and that is where you will find it, too, in most cities.

BRIDGEPORT BRASS COMPANY

Bridgeport **Connecticut**

The ELRECO Tubular Pole

—the Pole of Least Maintenance and Replacement

The cylindrical form of Elreco Tubular Poles, which makes them lowest in first cost, also makes them lowest in maintenance cost.

The committee on Power Distribution of A. E. R. A., after a thorough investigation, recommended the use of the Tubular Steel Pole. This is the only form of steel pole ever recommended by this committee. The record of simplicity, ease of handling, reliability and durability of Elreco Poles over a period of twenty-five years was reflected in this recommendation.

All steel products must necessarily be protected from corrosion. This is true of steel poles, and time has proved that Tubular Steel Poles are the least affected by action of the air and moisture and are most accessible for painting.

Elreco Poles have no angles or pockets to retain moisture, and no corners that are accessible to corrosion. Therefore, they are less subject to the ill effect of corrosion than are structural steel poles. Owing to the tubular shape any Elreco Pole can be furnished with protecting sleeve, which provides double thickness of metal at the ground line.

It is evident that the pole least susceptible to corrosion will give the longest life—The ELRECO has that record.

ELRECO Tubular Poles

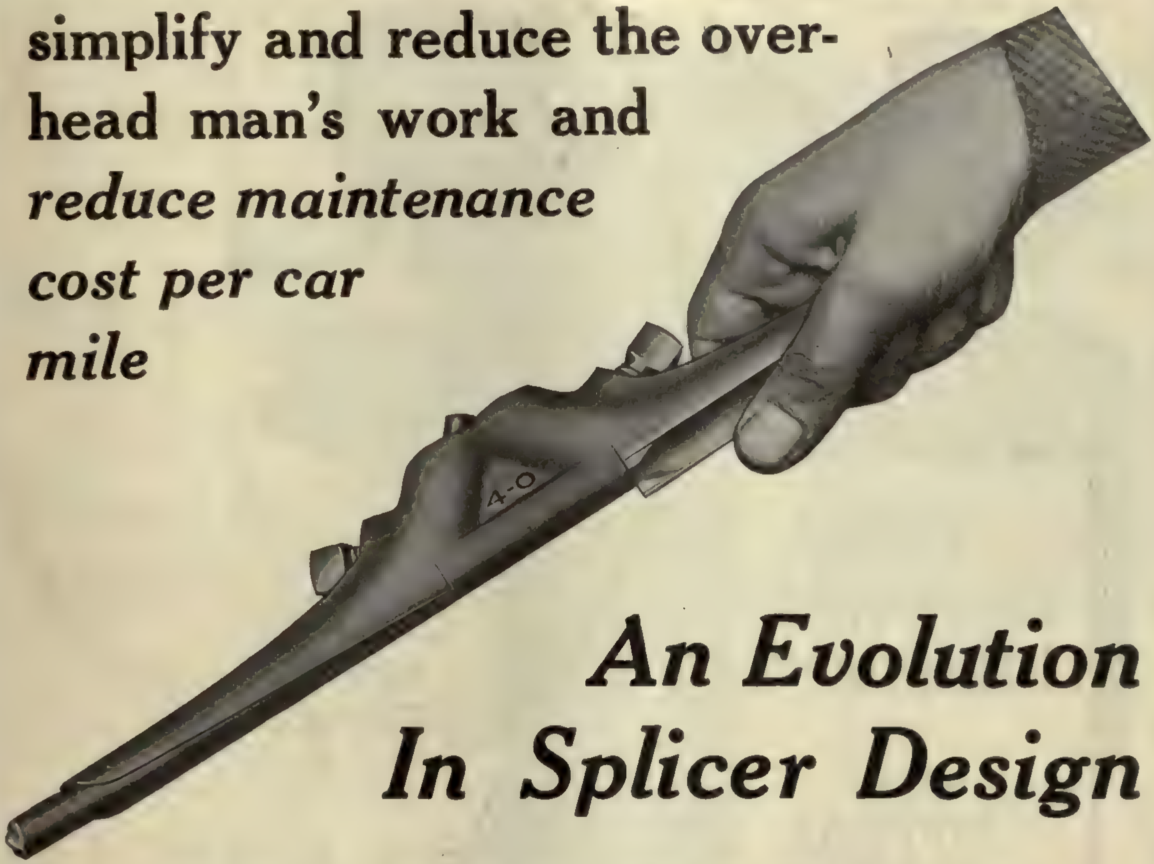
Combine

Lowest Cost
Lightest Weight
Least Maintenance
Greatest Adaptability

Electric Railway Equipment Co.
Cincinnati, Ohio
New York: 30 Church St.

SAMSON SPLICERS

simplify and reduce the overhead man's work and *reduce maintenance cost per car mile*



An Evolution In Splicer Design

The Samson design was tried out under every service condition on an operating road for three years before the present standardized design was adopted. The alloy from which Samsons are now made is the result of the same careful studies.

This careful balance of standardized design and standardized materials results in MAXIMUM service efficiency. It is the reason that Samsons have a universal reputation for being non-arcing, not forming hard spots in the trolley, staying upright in the span, and having strength and life in service in excess of new wire.

Samsons bring themselves to users' attention forcibly—by the lack of necessity for replacement. On "the car-mile basis" Samsons cost least.

Drew Overhead Line Material is standard on keenly managed roads.
Full particulars on any item gladly sent on request.

DREW ELECTRIC & MFG. COMPANY

Offices and Works: 1016 E. Michigan Street, Indianapolis, Ind.

District Representatives

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Chicago, Ill.

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903 Monadnock Building,
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1124 Pine St.,
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MEANS "SERVICE EFFICIENCY"

COLLIER SERVICE

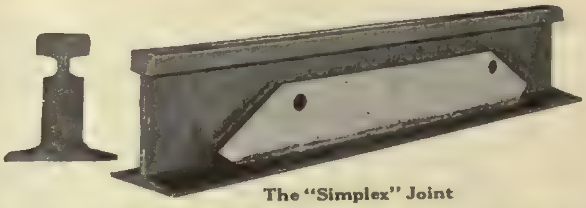
YOU
are cordially
INVITED
to INSPECT
our
NEW
CENTRAL
PLANT
▽

CANDLER
BUILDING

220 W. 42nd. St.
NEW YORK CITY

CAR
ADVERTISING
ALMOST
EVERYWHERE

Barron G. Collier
INCORPORATED



The "Simplex" Joint

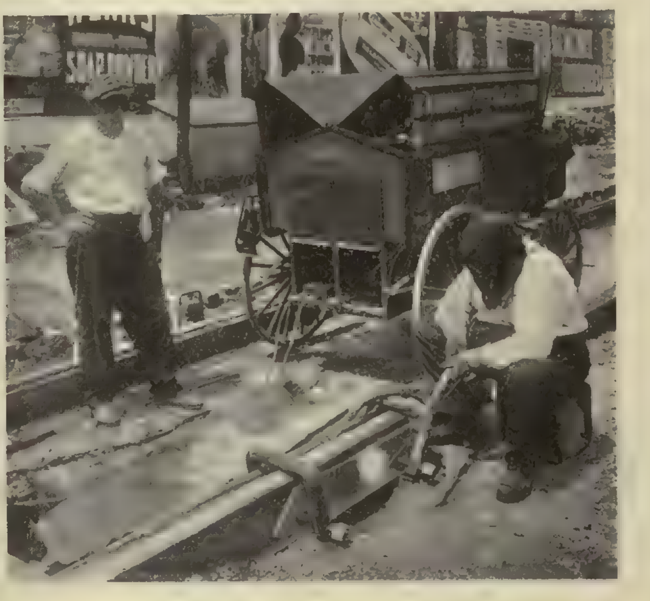
The Price Per Joint

is the only
cheap thing about

"Simplex"
Welded Joints

and the

Indianapolis Portable
Electric Welder



Fifty pairs of "Simplex" plates were applied by the United Light & Railways, Davenport, Iowa, to a 7-inch tram girder section rail two years ago.

Though the foundation was rather poor, these joints are still in perfect electrical and mechanical condition—and the total cost per joint was only $3.75.

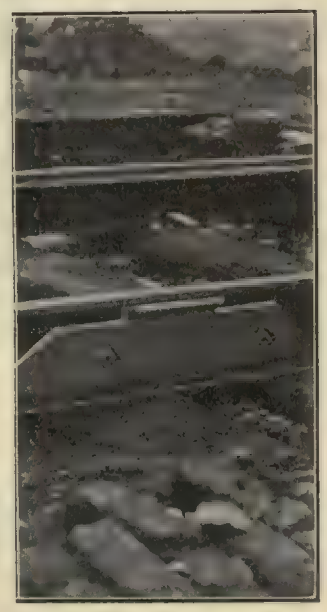
Indianapolis Welder in use by Davenport Light and Railways

That is only one of the many reasons why more "Simplex" and "Apex" Joints were sold during the first 6 months of 1916 than during all of 1915—ask us to tell you the others.

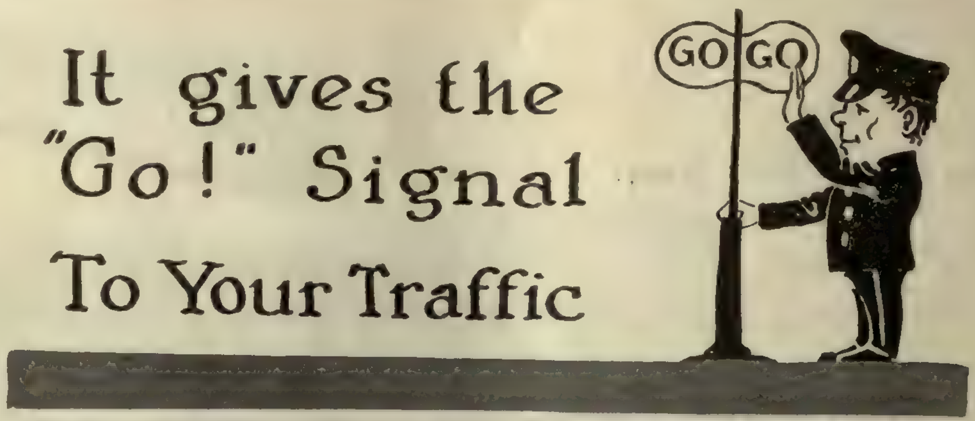
Indianapolis Switch
& Frog Company

Springfield, Ohio

New York Chicago



"APEX" Joint installed by Davenport Light and Railways

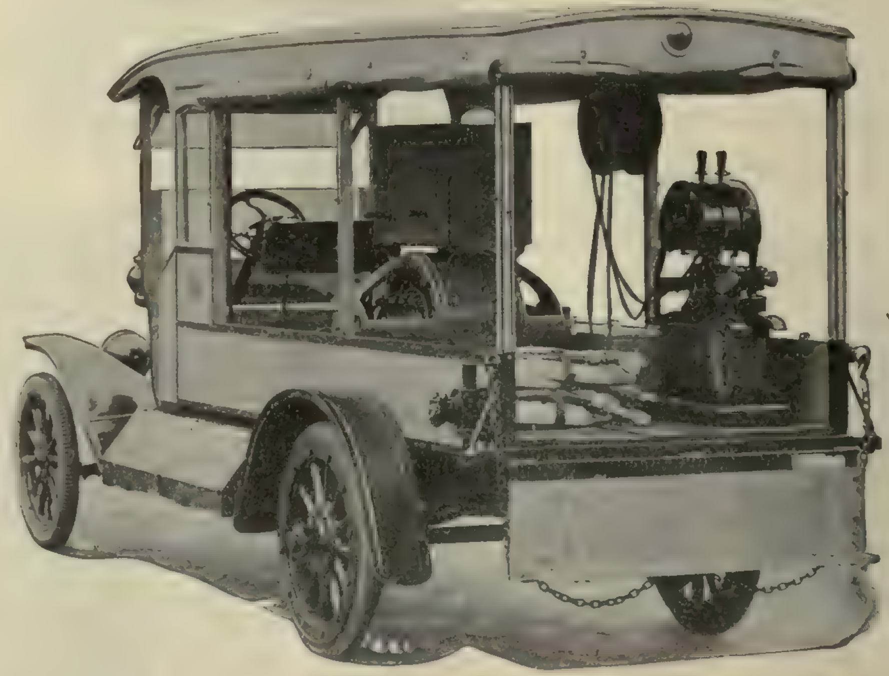


No more disruption of schedules while bonding work is in progress—your cars can run straight past the work, even while the welding clamps are on the rails, if you use a

Champion Bonding Truck

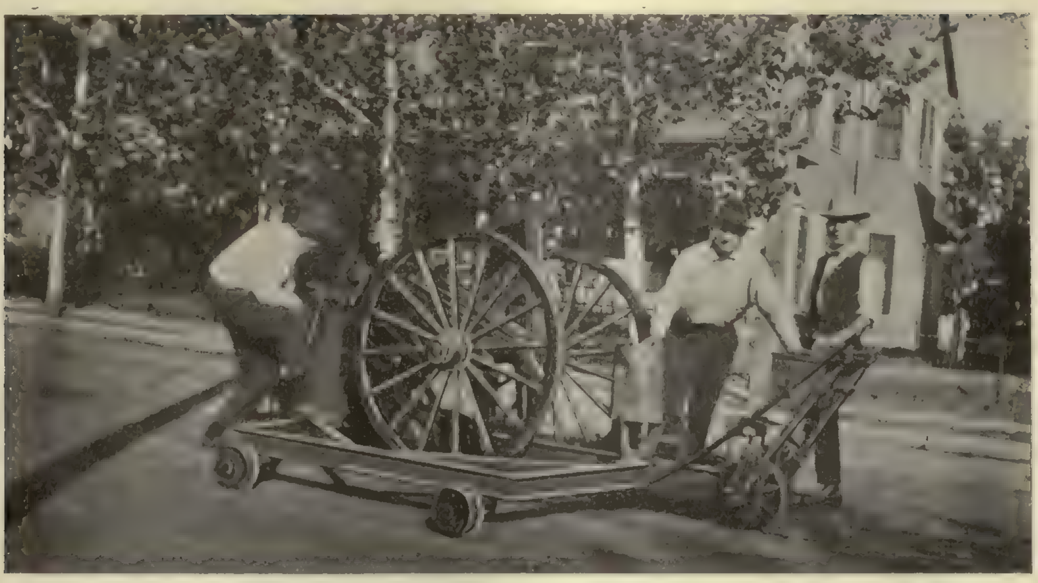
The Champion System saves rails, bonds, schedules, labor and therefore MONEY.

Write today for details



The Electric Railway Improvement Co.

Cleveland, Ohio



They're Grinding Two-Year-Old Track for 15 Cents a Joint, in Dallas, with a

Reciprocating Track Grinder

—and removing corrugations from 500 feet of single rail in a 10-hour day—on a line carrying a traffic of 250 cars per 10 hours.

Cars are delayed less than 10 seconds—and the crew can remove the grinder, let the car by, and have the grinder back at work on the track in 40 seconds. And one set of abrasive bricks is good for 5 or more days' grinding.

These results, on the line of the Dallas Consolidated Electric Railway Co., are typical of what the Reciprocating Track Grinder is doing all over the world—in Shanghai, Dublin, Manila, New York, San Francisco, Toronto and other cities.

Its superior efficiency is most clearly and easily seen when its operation is compared on the job with other apparatus, and nearly all of the Reciprocating Grinders now in use in the United States have been purchased after such definite competitive demonstration.

Write today for detailed information.

The Railway Track-work Co.
30th and Walnut Streets, Philadelphia

You Railway Men Are Vitally Interested in Paving

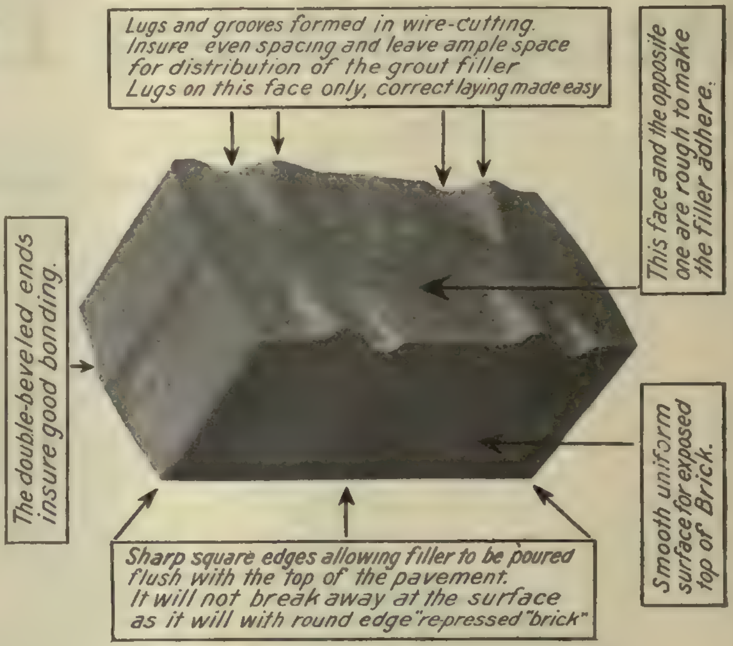
No matter what sort of arrangement you have with the city or town authorities, you need, and should insist on having, a smooth, durable pavement of such structure that it will stand the vibration of your heaviest traffic and keep water away from your track substructure.

Study This Illustration and See Why Wire-Cut Lug Brick

is the ideal paving for use on *all* street surfaces and particularly between electric railway tracks.

Note the big, generous Lugs which definitely assure just the proper gap between bricks for grouting. See those sharp, square edges, which permit bringing the grout up flush with the top of the pavement. See the rough sides and the bulged ends, which assure a perfect bond.

And remember that the wire-cut method effectively conserves all the strength of the clay—you get a homogeneous brick of the highest possible wearing quality. Dunn Paving Engineers are anxious to help you solve your paving problem.



Lugs and grooves formed in wire-cutting. Insure even spacing and leave ample space for distribution of the grout filler. Lugs on this face only, correct laying made easy

This face and the opposite one are rough to make the filler adhere.

The double-beveled ends insure good bonding.

Smooth uniform surface for exposed top of Brick.

Sharp square edges allowing filler to be poured flush with the top of the pavement. It will not break away at the surface as it will with round edge "re-pressed" brick"

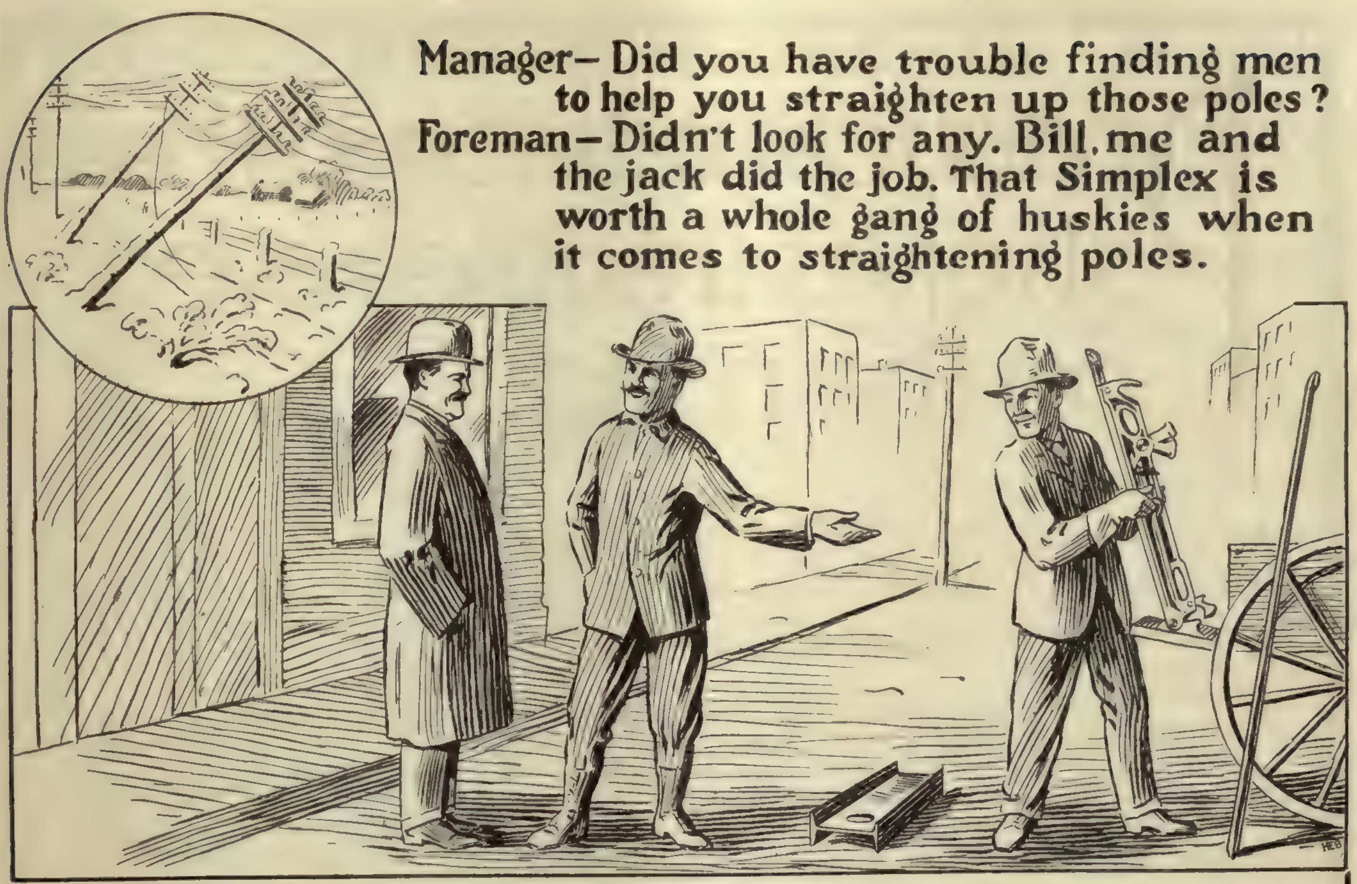
Manufacturers Licensed by

Dunn Wire-Cut Lug Brick Co., Conneaut, Ohio

LICENSEES:

- Corry Brick & Tile Company, Corry, Pa.
- United Brick Company, Greensburg, Pa.
  - One plant at Conneaut, Ohio.
- Sterling Brick Company, Olean, N. Y.
- Reynoldsville Brick & Tile Co., Reynoldsville, Pa.
- Danville Brick Company, Danville, Ill.
- Clinton Paving Brick Company, Clinton, Ind.
- Alton Brick Company, Alton, Ill.
- Medal Paving Brick Co., Cleveland, Ohio.
  - One plant at Cleveland, Ohio.
  - One plant at Carrollton, Ohio.
  - One plant at Malvern, Ohio.
  - One plant at Wooster, Ohio.
- Metropolitan Paving Brick Co., Canton, Ohio.
  - Four plants at Canton, Ohio.
  - One plant at Willow, Ohio.
- Bessemer Limestone Co., Youngstown, Ohio.
  - Three plants at Bessemer, Pa.
- Peebles Paving Brick Co., Portsmouth, Ohio.
  - Two plants at Portsmouth, Ohio.
  - One plant at Firebrick, Ky.
- Murphysboro Paving Brick Co., Murphysboro, Ill.
- Southern Clay Mfg. Co., Chattanooga, Tenn.
  - One plant at Robbins, Tenn.
  - One plant at Coaldale, Ala.
  - One plant at Birmingham, Ala.
- McAvoy Vitrified Brick Co., Philadelphia, Pa.
  - One plant at Perkiomen Junction, Pa.
- Windsor Brick Company, Akron, Ohio.
- Hocking Valley Brick Co., Columbus, Ohio.
  - One plant at Logan, Ohio.
- Veedersburg Paver Co., Veedersburg, Ind.
- Springfield Paving Brick Co., Springfield, Ill.
- Terre Haute Vitrified Brick Co., Terre Haute, Ind.
- Albion Vitrified Brick Co., Albion, Ill.
- Alliance Clay Products Co., Alliance, Ohio.
- Westport Paving Brick Co., Baltimore, Md.
  - One plant at Westport, Md.
- The Mack Mfg. Co., New Cumberland, W. Va.
  - Four plants at New Cumberland, W. Va.
- The Hydraulic-Press Brick Co., St. Louis, Mo.
- The Barr Clay Co., Streator, Ill.
- Burton-Townsend Co., Zanesville, O. Two plants.
- The Trimble Paving Brick Co., Dayton, Ohio.
  - One plant at Trimble, Ohio.
  - One plant at Glouster, Ohio.
- The Thornton Fire Brick Co., Clarksburg, W. Va.
  - One plant at Thornton, W. Va.
- Indiana Paving Brick & Block Co., Brazil, Ind
- Standard Brick Co., Crawfordsville, Ind.
- Shawmut Paving Brick Works, Shawmut, Pa.
- The Pennsylvania Clay Co., Pittsburgh, Pa.
  - One plant at Conway, Pa.
  - One plant at Crows Run, Pa.
  - One plant at Bradys Run, Pa.
- Clydesdale Brick & Stone Co., Pittsburgh, Pa.
  - Plant at Elwood City, Pa.
- John Kline Brick Co., Wickliffe, Ohio.
- Streator Clay Mfg. Co., Streator, Ill.
- Martinsville Brick Co., Martinsville, Ind.
- Cleveland Brick & Clay Co., Cleveland, Ohio.
- Jamestown Shale Paving Brick Co., Jamestown, N. Y.
- Purington Paving Brick Co., Galesburg, Ill.

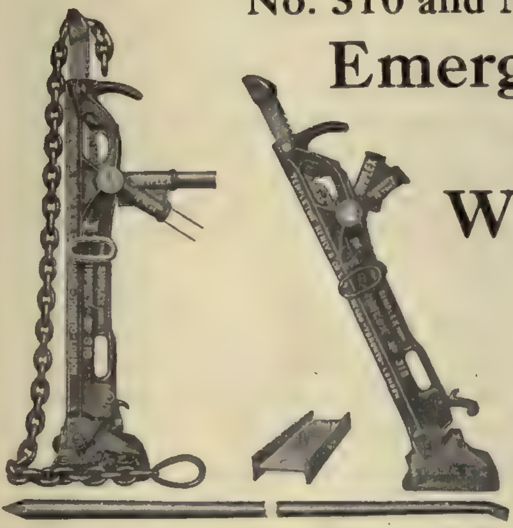
Manager—Did you have trouble finding men to help you straighten up those poles?
Foreman—Didn't look for any. Bill, me and the jack did the job. That Simplex is worth a whole gang of huskies when it comes to straightening poles.



SIMPLEX JACKS

No. 310 and No. 318 make a complete

Emergency Outfit for Winter



It pivots on its base

No. 318 will straighten a pole without digging around it or straining the backs of the linemen. It will pull or push a pole into place and *hold it* for sighting and tamping.

No. 310 will lift any street car onto the tracks or push obstructions from the right of way. It pivots on its base and follows the load without the use of wedges. Every car and emergency wagon should be equipped with Simplex Jack No. 310.

Send for complete catalog showing Simplex jacks for every purpose

Templeton, Kenly & Company, Ltd.

LONDON 1020 So. Central Ave., Chicago TORONTO

Practical advice in the shop is trouble saved on the road

That is one of the many benefits secured through our free Expert Service. Read the following partial report from one of our Experts:

"The manager understands of course that if the bearings are in poor condition, even the best oil will not prevent trouble, but he is greatly perturbed by the hot boxes on their interurban cars. I have made *suggestions* to obviate this and bring about permanent betterments to the service, as follows:

"First—The work of rebabbitting journal brasses should be done at the main shop and by one man, so as to place the blame for poor work that is being done.

"Second—That a more liberal supply of new brasses be placed in service, as there are a number of the old ones that must be scrapped.

"Third—That as soon as possible rebabbitting of journal brasses be discontinued and the brass be allowed to wear to a scrapping point and then taken out of service.

"Fourth—On account of the high speed and weight of cars, there should be a more liberal renewal of high grade packing, as a large proportion of the journal packing now in service is short strands, and while it would prove satisfactory in slower service, it is not conducive to good operation under the present conditions.

"Also, I have *requested* them to discontinue a practice which, no doubt, has been the cause of a part of the journal trouble, and if continued it will ruin the journals. I refer to a block of wood that has been made in the form of a journal brass and when they have a hot journal they remove the brass and put in the block of wood with a sheet of emery cloth on its face and then run the car. The result is another hot journal, as it is impossible to remove all the emery from the journal without removing the journal box. Furthermore, any irregularity in the journal face or diameter will be aggravated by such a proceeding and new journal brasses will have so little surface in contact with the journal that the weight per square inch is out of all proportion to what it should be. This was proven by an inspection of journal brasses that had only been in service twenty-four hours. The journal box dust guards have not had the attention they deserve, and there are a number of journals without them."

Little things? Yes. But it was the viewpoint of a practical outside man that discovered them and realized their important effect on good service. That is what our Experts will do for you—point out the little faults, far reaching in their unfavorable effect on your service, that you have lived so close to that they have been unnoticed. And note that our man made only SUGGESTIONS and REQUESTS of the railway officials—no commands, no arbitrary demand that such and such a thing be done—it is up to the officials to accept or reject our recommendations. But the wide-awake railroad man is looking for practical advice. And we are equipped to give it to him.

Galena-Signal Oil Co.

Franklin, Pa.

Transportation Salesmen Are Worth More to You Than Platform Laborers

In these days, with **National Pneumatic** door and step control available for every air-brake car,

It is as absurd for a motorman or conductor on a busy line to open doors and steps by hand—

As for a drummer to carry his own sample cases in lieu of hiring a porter.

The drummer who tires himself by carrying his own heavy luggage will have a lot less "pep" for his real job of selling goods.

The platform man who is obliged to tire himself by opening and closing doors by hand several hundred times a day naturally feels that he is just a Laborer—not a Salesman of Transportation.

As a **Laborer** will he not ignore stop signals to spare himself, while as a **Salesman** will he not take as much pride in the register reading as a drummer does in his sales sheet?

National Pneumatic Door and Step Control helps to make Salesmen of Transportation!

NATIONAL PNEUMATIC COMPANY

50 Church St. New York

515 Laflin St. Chicago

Do you want to know why the **OHMER SYSTEM** *Succeeds?*

WE ARE letting conductor W. D. Bond of Denver tell you. We quote from his recent article written for the benefit of his associates and published in the October number of the Tramway Bulletin.

"The Ohmer fare register in connection with the 'Ohmer System' of merit and demerit is designed to bring out the highest efficiency in every department of the conductor's work. Just as so many studies in college are designed to bring the student into his highest efficiency along other lines he is perfecting, so on the register we must reach a high degree of perfection on it to be 100 per cent proficient in all lines of 'Conducting Salesmanship.' The Tramway conductors can easily reach a per cent of 99 without imposing any hardship or undue overwork, and find it just as easy to do perfect as imperfect work, thereby improving in every line of duty, taking more interest in all branches of the service, and rendering to the Company a full degree of efficiency that would prove of inestimable benefit to the public, investor, employee and for the good of all.

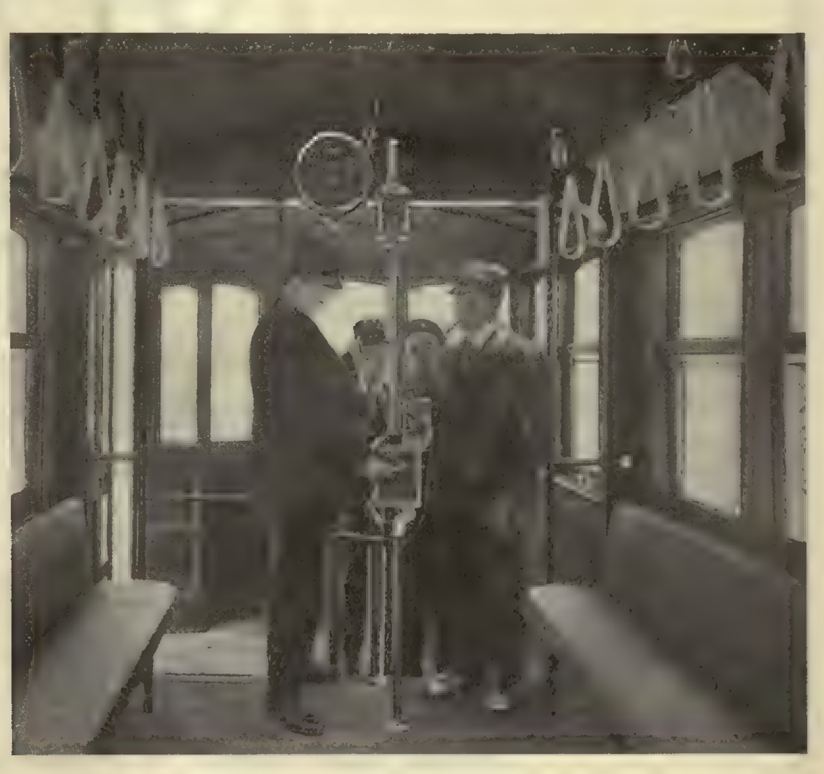
"To the Ohmer register is the credit due for developing a conductor's ability in every activity of the service. Carefulness in making a good record on the register breeds an increased degree of carefulness in every line of endeavor that confronts a conductor, and to the degree that he learns to perfect a system of exactness on the register so he does in every avenue of his work."

OHMER FARE REGISTER COMPANY

Dayton, Ohio

INTERNATIONAL
COIN AND TICKET REGISTERS

ARE
ESPECIALLY HELPFUL IN WINTER



WITH Winter weather tending to reduce your schedule speed, you will need International fare collecting mechanisms more than ever.

When the passengers come in bundled up to the neck, it's all the harder for the conductor to make change and collect—and REGISTER—fares with the facility necessary to insure a quick getaway for the car.

The INTERNATIONAL way of collecting and registering fares, by combining the functions of the farebox and the register through the turning of one handle,

Allows the Car to Get Away Quickly

because the conductor can serve the passengers with far more ease. He knows that he will not have to worry about making farebox and cash register tell the same story.

And if your conductors are on cars in *very* heavy service, why there's the INTERNATIONAL MOTOR-DRIVEN COIN REGISTER as the last word in rapid and exact fare collection and fare registration.

There's an International Fare Mechanism that best meets your needs. If not, we will undertake to make it.

THE INTERNATIONAL
REGISTER COMPANY
15 SOUTH THROOP STREET
CHICAGO

1917

What Are Your Sales Plans for the New Year?

Electric railway earnings for 1916 are proving a lot better than for 1915.

For instance, the operating revenue of companies operating a total of 7,444 miles of line, for January 1 to June 30, 1916, were $100,582,214—

—or 8.08 per cent more than for the same period of 1915.

Electric railways will buy more in 1917:

Because of constantly rising earnings due to the general good times—

Because money available for improvements and extensions is so abundant—

Because betterments in equipment and in operating practice promise a bright future for electric railway properties.

You Can Get Your Full Share of Business

only by backing up your products, your facilities and your salesmen by a carefully planned advertising campaign in the one medium which reaches 99 per cent of your customers—

Electric Railway Journal

Whatever plans you may have for the year as a whole, you must not fail to appear in the first issue of the year, with its exclusive data on the business of the year, the

Annual Statistical Number

January 6, 1917

Medium Range Color Light Signal

Especially Applicable to Interurban Railway Service

Indications given from 1500 to 2000 feet on tangent track under average daylight weather conditions.

Lamps are interchangeable so that no adjustment is necessary on the ground to secure satisfactory service when lamps are renewed.

Arrangement is provided for securing proper alignment of signal quickly and accurately when signal is installed.

This signal represents the application of engineering knowledge gained through long experience with light signals, the result being indicated by its simplicity, universality and economy.

The Union Switch & Signal Co.

SWISSVALE, PA.

Trade Mark

Hudson Terminal Bldg.
NEW YORK

Peoples Gas Bldg.
CHICAGO

Canadian Express Bldg.
MONTREAL

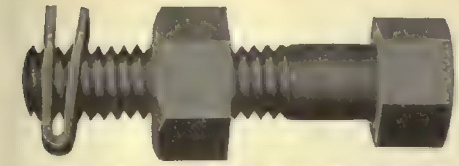
Candler Annex
ATLANTA

Railway Exchange Bldg.
ST. LOUIS MO.

Pacific Bldg.
SAN FRANCISCO

Represented by the GENERAL ELECTRIC CO. in Australasia, South Africa and Argentina

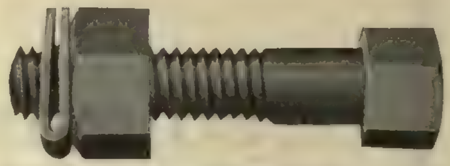
Trade Mark



Spring Nut Lock, loose, applied on bolt before being set in place to hold until taken off

Front view

Rear view



Spring Nut Lock tightened against Nut. Prevents shaking off—follows nut tightening against material

Will Firmly Lock All Nuts in Place on the Machines You Make or Use

SPRING NUT LOCKS

save the **countless** losses that are constantly occurring wherever machines are run and part is fastened to part by nuts and bolts

Better Be Safe Than Sorry

Whether you manufacture, sell or use any part of a machine **see to it** that every nut is **safely, SECURELY, PERMANENTLY** locked in place on its bolt with a **Spring Nut Lock.**

Increase the ***reliability,*** DURABILITY, STABILITY of your cars, tractor, battery or machinery by slipping on over *every* nut that engages a thread this simple, light, cheap and positively *efficient* device that holds any nut permanently in place and yet may be released at will—when lock, nut and bolt are as good as ever and can be used over again as often as desired.

You cannot afford to be without *Spring Nut Locks.* You cannot afford the loss of prestige, the mental worry, the risk of serious losses in life, limb and pocket-book that are liable to occur at *any moment* where vibration can start nuts loosening that are not properly locked in place, but are yet expected to hold vital parts. *The Spring Nut Lock is your safety insurance.*

In anticipation of the great volume of advance orders that have already begun to pour in on us as the merits of this great little device are becoming known to the mechanical world, we have let contracts for the manufacture of *Spring Nut Locks* to The Stowell Company of South Milwaukee, Wis., who have one of the largest plants in the country adapted to turning out this safety necessity in the enormous quantities it will be needed.

The Lock slips on the bolt like a washer and as easily —*economy of time in application.*

Its cost to the user is a mere trifle more than a washer —*the initial economy.*

It will not cut the thread of the bolt—*enduring economy.*

Price lists are now ready. Write us for your probable needs NOW. Get in line to get *your share of this first output.* Send us your name and business and get our *price lists* for your guidance.

Spring Nut Locks for Standard Threads for the following sizes are scheduled for delivery on or before January 1st: ⅜ in., ½ in., ⅝ in., ¾ in., ⅞ in. and 1 in. By February 1st we hope to be able to fill all orders promptly, however large. In the meantime look out for your own needs by getting in touch with us immediately. Allotments will be made from first output in proportion to the size of the advance order filed with us. Orders filled in rotation as received.

Spring Nut Locks for S. A. E. Standard Thread for automobile use have been thoroughly tested out and have aroused the enthusiasm of automobile men wherever tried. Locks for S. A. E. Standard Threads for 5-16 in., ⅜ in., 7-16 in., ½ in. and 9-16 in. are also in preparation and will be ready about January 1st. Get in your orders at once.

Jobbers, Dealers, Railway Men—all Dealers—should take steps to supply the early demand of their customers for Spring Nut Locks. **Manufacturers** who take pride in their product should be prepared to adopt them. **Railroads** where economy and safety are first must have them. Write us your needs today and let us help you.

SPRING NUT LOCK COMPANY

656 Transportation Bldg. :: :: :: Chicago, Illinois

Hale and Kilburn
The Spring-Edge Cushion

Hale & Kilburn seats are made to give 100 per cent comfort to the passenger—from the shoulders to the tendons of the inner side of the knee.

Hence the pains taken by us to provide a broad, flat, elastic edge to cap the springs of the cushion—

Thereby preventing sharp edges which would cause discomfort—

And securing a truly flexible, non-denting "come-back" construction entirely unlike the old-fashioned wire edge, with its tendency to bend and "set."

This is but one of many traffic-building features of Hale & Kilburn No. 300-FE seats, as used for high-class interurban railways. It will pay you to study our seats in detail.

Pioneers in Steel Trim for Passenger Cars, including interior finish, steel doors, etc.

HK WALKOVER
COPYRIGHTED

Hale and Kilburn Co.

Philadelphia New York Chicago
Washington San Francisco

HK WALKOVER
COPYRIGHTED

Miller Sliding Shoes Used Exclusively Wire Wear Imperceptible

The cars of the Portland-Lewiston Interurban Railroad operated up to 60 m.p.h. are equipped with Miller Sliding Trolley Shoes.

On July 7, Aug. 7 and Oct. 2, 1916, measurements of the No. 0000 copper trolley were made at certain poles to see how much, if any, the wire had been worn. Here are the results in thousandths of an inch:

Pole No.	July 7	Aug. 7	Oct. 2
29	0.475	0.475	0.475
50	0.485	....	0.485
72	0.482	0.482	0.481
83	0.482	0.482	0.481
85	0.4795	0.4795	0.4795
102	0.484	0.484	0.483
107	0.482	0.482	0.482
109	0.482	0.482	0.482
117	0.4825	0.4825	0.4825
195	0.481	0.481	0.481
210	0.482	0.482	0.482
338	0.487	0.487	0.487

Out of eleven locations none showed more than one-thousandth of an inch wear!

Why not measure the wear on your line due to trolley wheels and then make a parallel test following its equipment with Miller Trolley Shoes?

We'll await your verdict with confidence!

Miller Trolley Shoe Company

53 State Street **Boston, Mass.**

Sales Representatives:

Holden & White—Chicago
W. F. McKenney—Portland, Oregon
F. F. Bodler—San Francisco, Cal.

S. I. Wailes—Los Angeles, Cal.
Alfred Connor—Denver, Colo.
T. C. White & Co., St. Louis, Mo.

W. M. McClintock—St. Paul, Minn.
A. I. Sanger & Son—Cleveland, Ohio

Portland-Lewiston Interurban Car Equipped with Miller Trolley Shoes

Meets the Emergency

ARISTOS
"COPPERWELD"
COPPERCLAD STEEL
WIRE
COPPER CLAD STEEL CO., PITTSBURGH, PA.
MAKERS OF
A PERFECT WELD WITHOUT VOIDS
ARISTOS
"COPPERWELD"
TRADE MARK REG. U.S. PAT. OFF.
DRAWN AND SOLD BY
PAGE WOVEN WIRE FENCE CO. MONESSEN, PA.

First Cost Less
Than Copper
7% Lighter
(Size for Size)
60% Stronger
126% Greater
Elastic Limit
Maintenance
Cost Less Than
Copper

Western Sales Office:
Steel
Sales Corporation
Chicago, Illinois

Eastern Sales Office:
Page Woven
Wire Fence Co.
30 Church St., N.Y.

Made from the product of COPPER CLAD STEEL CO., Pittsburgh, Pa.
Drawn and Sold Exclusively by
PAGE WOVEN WIRE FENCE CO., Monessen, Pa.

Duraduct

Reg. U. S. Pat. Off.

The *Flexible* Conduit is on This Flexible Train

All the electric railway world knows the famous Lindall articulated unit—the snake car that takes any curve with serpentine ease!

It's perfectly logical that the latest fifty-two articulated units of the Boston Elevated Railway now in hand should be equipped with Duraduct—the flexible conduit.

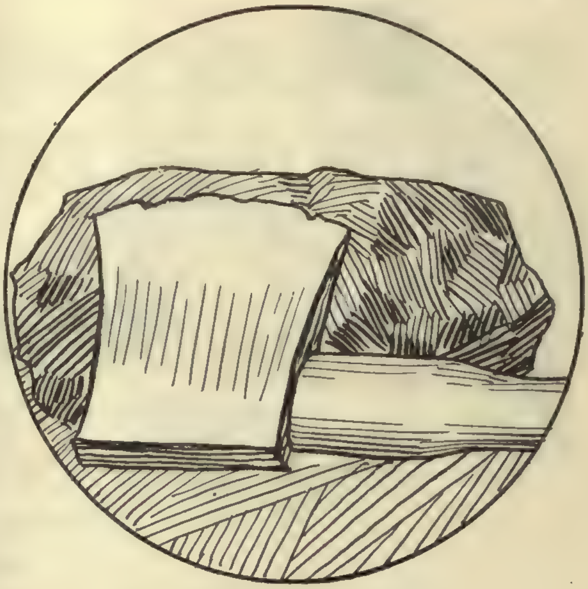
Each operating unit consists of two 25 feet double-truck cars with a vestibule between. Duraduct of these lengths and sizes handles all wire: 40 feet ¾-inch, 150 feet ⅝-inch, 50 feet ½-inch, and 100 feet ⅜-inch.

Not only flexible—but light. All the Duraduct for this unit weighs less than 31.5 pounds.

Yes. They're going on the next fifty Lindalls, too!

Sample on Request

TUBULAR WOVEN FABRIC CO.
MANUFACTURERS
PAWTUCKET, R. I.
A. HALL BERRY, General Sales Agent
97 Warren Street, New York 9 South Clinton Street, Chicago
Distributors for Canada: NORTHERN ELECTRIC COMPANY, Ltd.



You Can Split a Piece of Wood— BUT— You Can't Split a Piece of Stone

Ever stop to think why it's easy to split wood and practically impossible to split stone? It is because the wood has a well-defined "grain" which allows easy separation, whereas the stone has no grain—it is homogeneous. And, for the same reason,

Agasote Roofing Won't Split—

It Has No "Grain"—It Is Homogeneous

It has about as much grain as a stone or a piece of cement—and, like cement, the longer it is used the stronger it grows.

In case of accident, a car roof of Agasote is easily repaired—because it won't split or splinter, the damage is localized. Merely cut out the damaged section, fit in a new piece of Agasote, and your roof is good as new.

Agasote requires about half as many carlines as a wooden roof—it's the lightest, strongest, most durable roofing you can put on your cars, and it serves also as headlining.

It costs less to apply, less to haul around and less to repair, than any other roofing—and it is permanent. Investigate it.

Pantasote—The recognized standard material for car curtains

The Pantasote Co.

Manufacturers also of Pantasote—the most widely used and highly standardized railway car curtain material on the market.

11 Broadway, New York
People's Gas Bldg., Chicago, Ill.
797 Monadnock Bldg., San Francisco, Cal.

"I've told you men before,"

said the Claim Agent, "and I tell you again now, that we've got to take some immediate action on this accident question. Look at that accident on the Marble Avenue line, among others!"

"Looks as if he were right," remarked the Superintendent of Transportation. "You know that line runs through the tenement and factory district, where kiddies and grown-ups are all over the street. Hard enough to keep schedules anyway, but with an accident every day or so, my schedule-sheet for that line is a terror."

"One trouble is," added the Claim Agent, "that most of the accidents are to kiddies. And that works on the jurymen when the cases come to trial. They *know* the road was run-down when we took it over, and that what safety devices we had were a joke—and they just soak us the limit every chance they get."

The Master Mechanic spoke up. "Just for a real test, why not equip all the cars on that line with the H-B Life Guard or Providence Fender? They're known all over the world for their reliability in saving life, and I understand that on one big system they have shown 96 per cent efficiency in pick-ups."

"If they are making good," said the General Manager, "the way you say, I'll put through a requisition at once to equip that line at least, to see if they are worth their value."

The Consolidated Car Fender Co.
Providence, R. I.

General Sales Agents

Wendell & MacDuffie Co.
61 Broadway, N. Y.

Second of a series of talks on Fewer Accidents and Better Public Relations

HESS-BRIGHT BALL BEARINGS FOR NEW CARS AND OLD

The New York State Railways—Rochester Lines—will soon be installing Hess-Bright journal ball bearings on fifty new cars, which will weigh about 16 tons each for a seating capacity of fifty-two and a length of 50 ft.

Hess-Bright Ball Bearings will be found even more advantageous on old cars—

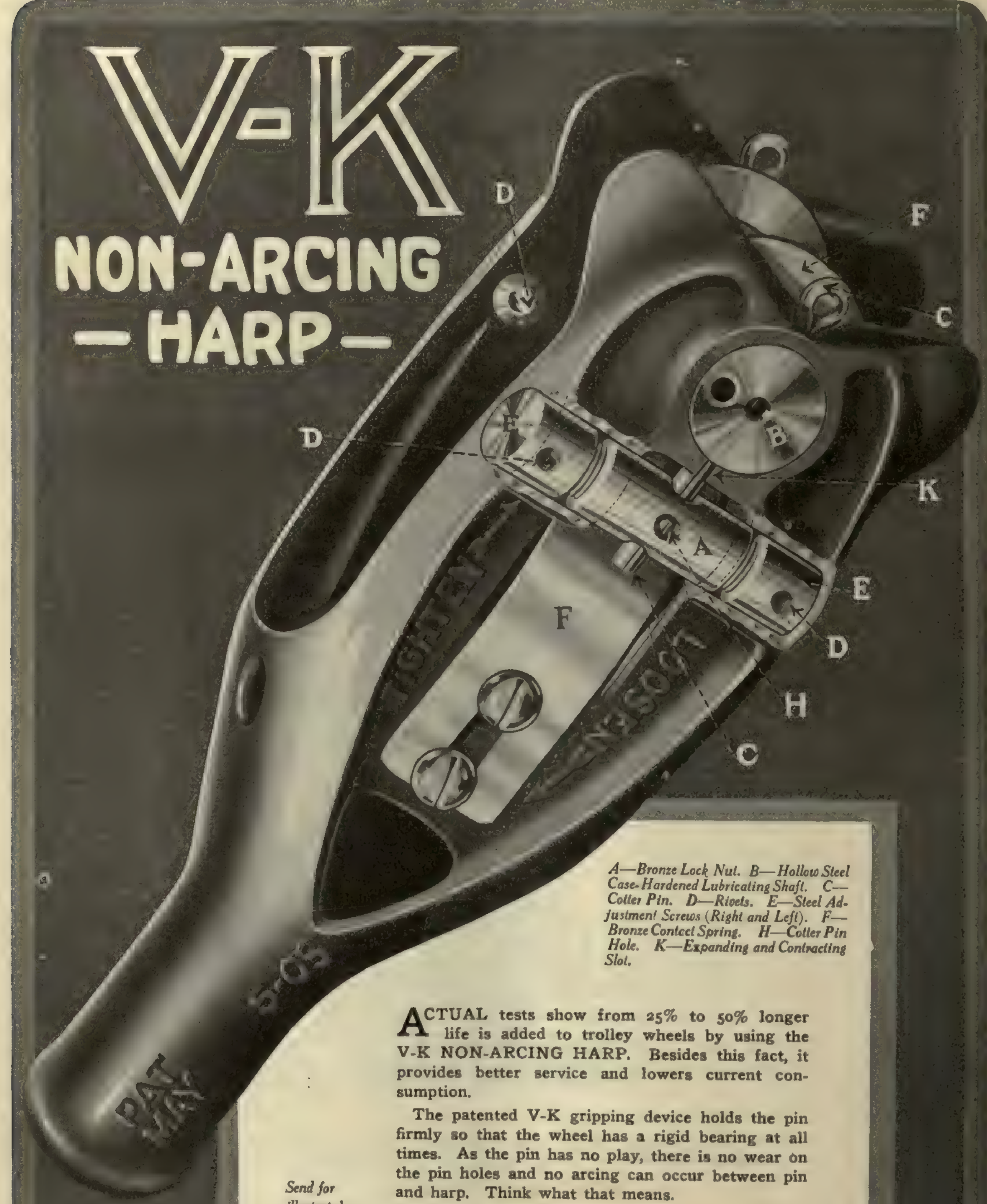
Since the older cars are usually heavier and the saving of Hess-Bright Ball Bearings is greater accordingly.

Let us confer with you on adapting Hess-Bright journal ball-bearings to your present cars as well as your new ones.

TRADE MARK
HB DWF
HESS-BRIGHT
THE INIMITABLE BEARING

THE HESS-BRIGHT MANUFACTURING COMPANY
FRONT ST. & ERIE AVE., PHILADELPHIA, PA.

HESS-BRIGHT CONRAD PATENTS ARE THOROUGHLY ADJUDICATED



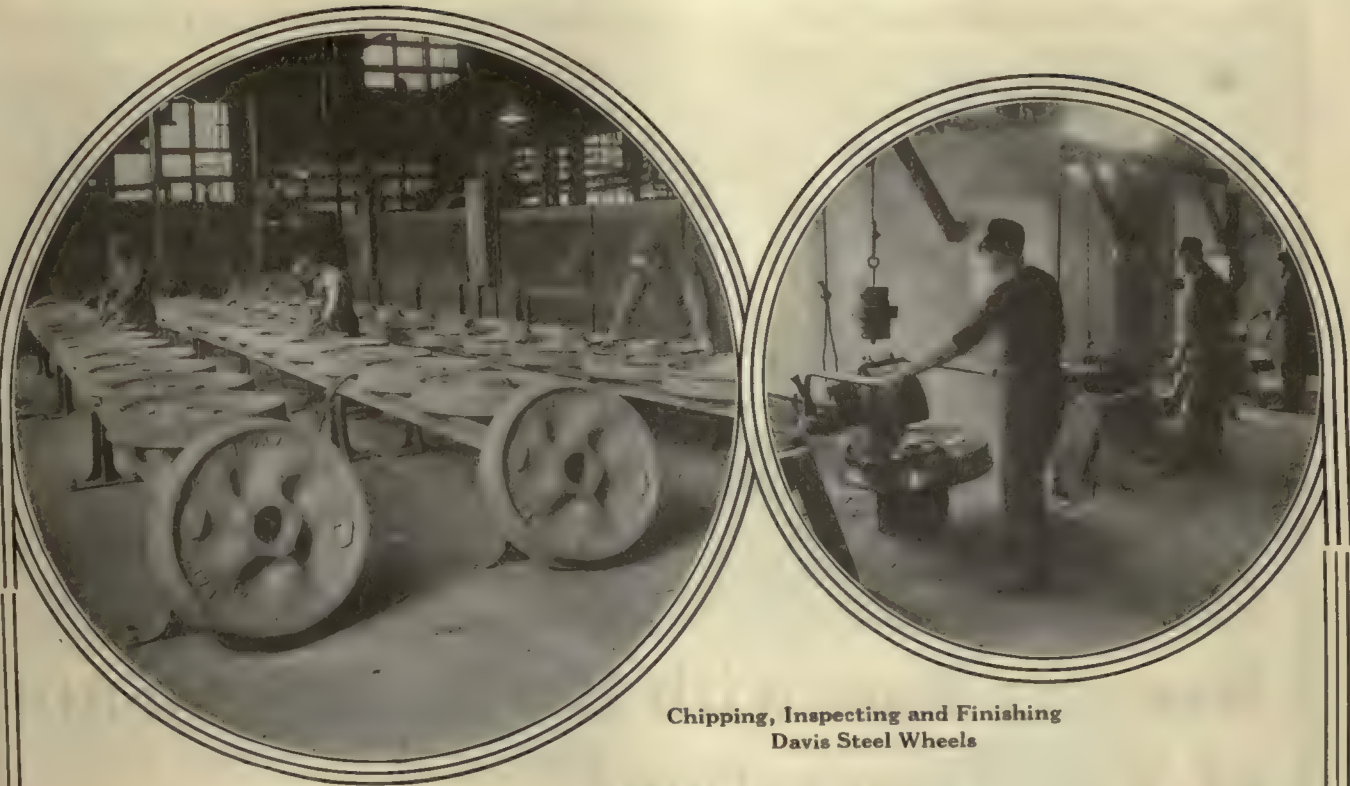
A—Bronze Lock Nut. B—Hollow Steel Case-Hardened Lubricating Shaft. C—Cotter Pin. D—Rivets. E—Steel Adjustment Screws (Right and Left). F—Bronze Contact Spring. H—Cotter Pin Hole. K—Expanding and Contracting Slot.

ACTUAL tests show from 25% to 50% longer life is added to trolley wheels by using the V-K NON-ARCING HARP. Besides this fact, it provides better service and lowers current consumption.

The patented V-K gripping device holds the pin firmly so that the wheel has a rigid bearing at all times. As the pin has no play, there is no wear on the pin holes and no arcing can occur between pin and harp. Think what that means.

Send for illustrated catalog

MORE-JONES BRASS & METAL CO.
St. Louis, U. S. A.



Chipping, Inspecting and Finishing
Davis Steel Wheels

Gauging and Smoothing Up Davis Steel Wheels

After being annealed the wheels are placed under a drop hammer which knocks out the gates or surplus metal from the pouring channels. Thence they pass through the shot blast, for cleaning sand and scale from the surface.

Workmen operating pneumatic chippers remove what few surface imperfections remain, while others carefully gauge each wheel to make sure that they are perfect. Rigid inspection insures absolute uniformity in this detail.

Next the wheels are put under the swing-grinders, where the riser stubs are ground down flush with the wheel surfaces.

Perhaps no one of these operations is an innovation in itself, but the skill and care devoted to doing it are unusual. Perfect wheels, and perfect wheels only, are shipped from our foundry.

Inspection at a dozen stages in the process are none too many when so many lives and so much property depend on strength and safety.

Get the complete story of the Davis Steel Wheel. Sent on request.

DAVIS
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The wheel with the one wear tread.

No turning—no trouble with motor clearances.

A hard tough manganese tread and flange.

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Reduction in weight.

20% saving in weight.

Minimum maintenance cost.

Strength—safety—economy.

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American Steel Foundries

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Keeping Pace with the Developments of Two Generations

Horse-car days.

We can all remember the frail little "match boxes" jerking and bouncing along a narrow-gauge "snake-trail" track behind one or two old broken-down cab horses. They tipped the scales at only one or two tons when loaded to capacity, and the speed seldom reached the hair-raising rate of 6 miles per hour.

Yet within this short space of years we have seen the electric car develop into a 60-ton palace, riding as smoothly as thistledown in the air at speeds as high as 70 miles per hour.

Do you fully appreciate the changes of the last 30 or 40 years?

Can you comprehend what this ever-increasing service has demanded of the car wheel manufacturer?

Although the pace has been a hot one, we have never lost our stride, never lagged behind. The Wonderful Single-Service Chilled Iron Wheel was standard in the days of the "hobbie-horse" car, and is standard today with over 90% of the street-car companies of the United States and Canada which operate 100 cars or over.

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Representing Forty-eight Wheel Foundries Throughout the United States and Canada. Capacity 20,000 Chilled Iron Wheels Per Day

55 Ton High Speed Interurban Service

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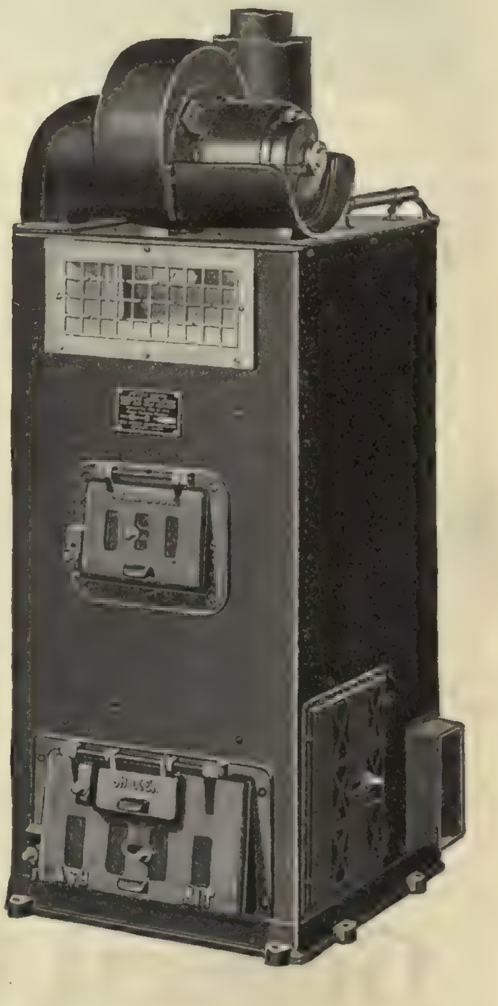
It's not always that a prophet is honored in his own country.

Not so with Peter Smith Forced Ventilation Hot Air Car Heaters. The Detroit United Railway Company doesn't stray far afield for heaters, knowing that the best are right at home.

And why not when it can get 50 deg. Fahr. throughout the car at all heating seasons—325 cu. ft. of fresh, warm air delivered every minute —at the insignificant cost of 28 cents per 18-hour day—these are some of the reasons why most progressive roads order more, and more and more Peter Smith Heaters.

United Railways Company of St. Louis, Toledo Railways & Light Co., Milwaukee Electric Railway & Light Co., Des Moines City Railway—these are only a few.

Ask for the complete list of Peter Smith Heater users—and let the Peter Smith engineers help *you* solve *your* heating problem.



PS HEATERS

The Peter Smith Heater Co.
Detroit, Mich.
Heater Specialists for Thirty-five Years

PS HEATERS

Insure Your Overhead Construction

The rain, sleet and snow of the coming Winter will not affect G-E Sherardized Line Material. Every iron and steel part is thoroughly weather-proofed by the improved G-E process, which constitutes the best insurance against rust and consequent breakage.

G-E Sherardizing not only gives a coating of zinc to the surface of the metal but causes this coating to form, with the iron, an alloy extending considerably below the surface and becoming an integral part of the whole. Thus scaling is impossible even under the most severe and prolonged service.

G-E Sherardizing successfully withstands the Preece test of successive immersions in copper sulphate solution and has proved its absolute reliability even under prolonged exposure to a concentrated salt spray. The G-E commercial test involves 168 hours' exposure in the standard salt spray box and no indications of corrosion have ever appeared as a result of this test.

All G-E Line Material is Sherardized by the exclusive G-E Electric Oven Process—a positive insurance against Winter's storms.

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ENGINEERING PAPERS AT C.E.R.A. MEETINGS

The meeting of the Central Electric Railway Association in Toledo last week was marked by the intensive interest shown by the managers of the various properties represented. In fact it was almost exclusively a managers' meeting, and the lack of engineering discussion on the technical papers was noticeable. There were only four master mechanics in attendance, so far as we can remember, and only two or three electrical engineers. Real progress was made by the managers, and we believe all went home with a much better perception of the need for giving the public first-hand information on the true conditions in the industry. But the value of the two technical papers was largely lost, due to the absence of men to discuss them from the engineering side of the industry. This suggests the advisability of special sessions or, possibly a separate section, of the association for the engineering side of the industry. True, the principal problems of to-day are managerial ones, but there are still many things puzzling the men who deal with the technical side. We already have the traffic and accounting subdivisions; why not an engineering subdivision of the C. E. R. A.?

RESTRICTING UTILITY STRIKES

Last week we devoted considerable space to the addresses and discussions on the subject of labor disputes before the Academy of Political Science in New York City. We did this not because we believed that the Academy had the power to make either an immediate or a profound impression upon public opinion, but because we thought that the various sessions would serve to assemble the views of government mediator, economist, employer and labor leader and make the public conscious of a possible drift of opinion in any direction. That there really was, in spite of the uncompromising attitude taken by the labor leaders, a basic principle underlying the opinions of the other representatives was quite evident. This principle involved the paramount right of the public to continuity of utility service. It was freely admitted that employees in general have a right to strike, but it was also averred that on public utilities this right should be subordinated to the public welfare and could constitutionally be made to become so subordinated when it created a public wrong. In such an event, however, it was felt that the public should guard employees by scientifically regulating wages, hours and working conditions, at the same time protecting utilities by seeing that increases in wages should be reflected in the rates. While, therefore, the sentiment at the conference was toward a realization of the need for governmental control over utility strikes, it included the idea that a restriction of the right to strike cannot fairly be demanded of labor without some provision for a more scientific method of adjusting labor questions. If the distrust of labor toward capital is to be removed, it would seem that this point should be considered.

RATES AND UTILITY INVESTMENTS

The hope of utility expansion in the future is the real investor and not the speculator. This statement, based on the remarks by Delos F. Wilcox, of which a short abstract is given in our financial department, ably sums up the fundamentals of utility financing, past, present and future. In the old days utilities were financed as speculative enterprises with more thought to a high rate of return than to security of either principal or return. At present, however, rate regulation tends to eliminate the speculative feature of utility securities, and to the extent that it provides security to make up for the lower rate of return, utility issues will increasingly appeal to another class of buyers, the investors. By sad experience, however, capital has learned that the bestowal of compensating security lags behind the removal of the chance for speculative profit. Capital, therefore, is inclined to hesitate in entering the utility field. If utility investments are to have the desired security, the public must fully give up some of its cherished illusions. For instance, as Mr. Wilcox says, the fancied protection of maximum or absolute rates fixed by franchise for a long term of years must be surrendered, and the public must frankly recognize that rate regulation involves the possibility of increases whenever justice so demands. Thus the public has a direct responsibility for the attitude of investors toward utility expansion. The public cannot well afford to bite off its nose simply to spite its face on account of past speculative returns.

A BIRD'S-EYE VIEW OF HEAVY TRACTION

It is often of help to see ourselves as others see us. This point of view is presented in the article on heavy traction affairs in this country, abstracted on another page from a recent contribution to *La Lumière Electrique*. The author, Joseph Carlier, professor of railways at the Belgian university at Liège, spent but a few weeks in this country last summer but seems to have made good use of his time. His views may be said to have been prepared from two angles, so to speak, a wide one including the heavy traction field as a whole, and a smaller one including only that portion operated by electricity. The broader view shows that there is a tremendous field for the electric locomotive and the motor car, considered as a factor in increasing the ability of a road to handle traffic, the prime requisite. In electric traction itself the professor sees two big factors which are to settle the question of system. One is the economical contact line voltage which is determined by density of traffic and length of line. A light traffic on a long line calls logically, in his opinion, for a high-tension distribution and therefore involves the use of alternating current on the trolley wire, while, vice versa, heavy traffic calls for the use of direct current. The other point brought out is the natural inclination of the railroad man for the direct-current system, everything else being equal, in spite of his appreciation of the excellent qualities of the single phase. If we get Professor Carlier's idea correctly he thinks that the preference of the railroad man is for the third-rail contact system on account of its simplicity and freedom from overhead obstructions. Consequently there will be pressure to extend the range of third-rail operation by adapting it to higher voltages. In the professor's mind there is no question as to the complete technical success of the two great systems now in vogue. He says so, with the aid of numerous complimentary adjectives. At the same time he sees the larger future for direct current in the light of heavy electric traction economics.

TRUSS-SIDE CONSTRUCTION FOR RAILWAY CARS

That there should be a division of opinion as to the relative desirability of the truss-side and side-girder designs for steel cars is not surprising when one considers the novelty (comparatively speaking) of the whole question. Practice in an industry such as electric railway operation is notoriously conservative. Three years, for example, is hardly enough time for any suggested change to become of general knowledge, and yet it is only three years ago that this journal was combating a widespread opposition to the introduction of steel in place of wood as a material for car construction. Clearly enough the truss-side type of construction, which is a physical impossibility when steel is not available, could hardly arouse any great interest so long as an appreciably large section of the industry held a preference for wooden cars.

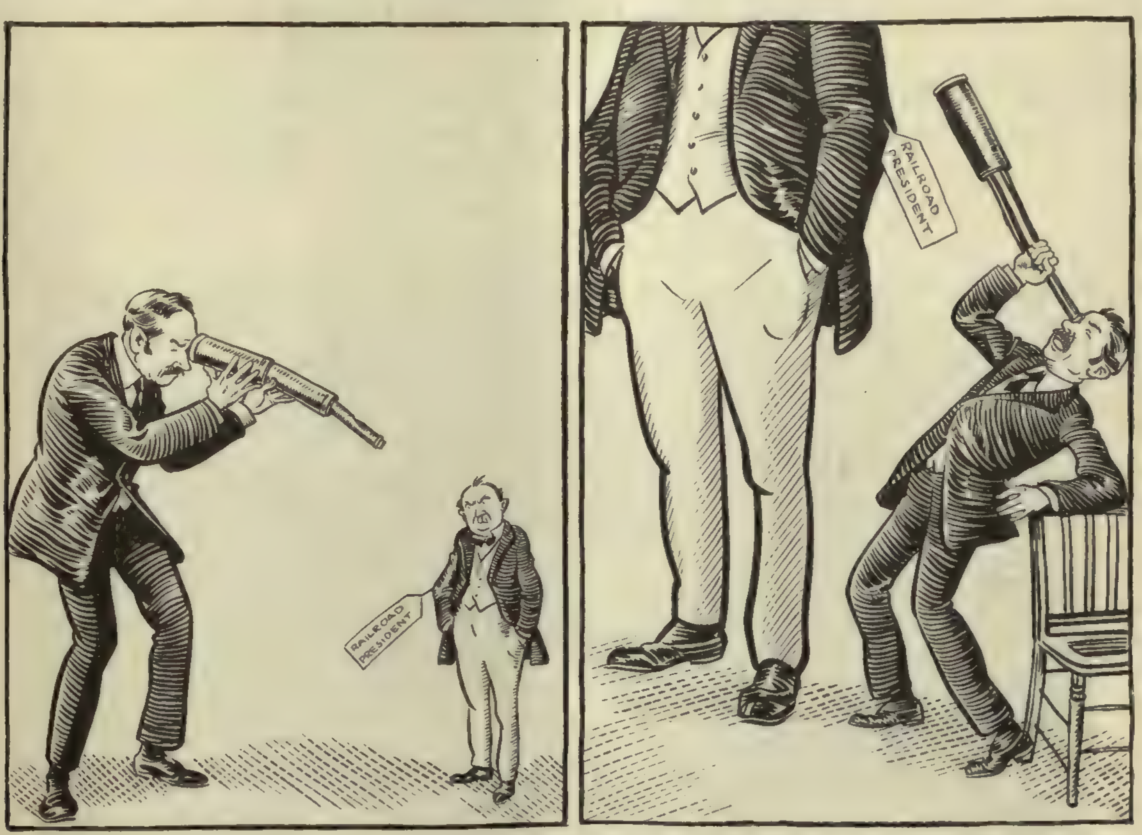
At the present time, of course, this situation has been wholly changed. So far as new orders are concerned the wooden car is no longer moribund—it is extinct. And with the passing of the wood-versus-steel controversy, more attention may well be, and undoubtedly will be, devoted to the new principles of design that are applicable with the new material of construction. These, as explained in L. B. Stillwell's Toledo paper, abstracted in our last issue, offer the alternatives of a side-girder construction and a truss-side construction, whose development of the whole car side to carry weight gives a beam height approximately 7 ft. The former was the first type of steel car upon the ground, and, excepting a few disastrous experiments with shallow steel underframe designs, it has until quite recently held the electric railway field exclusively.

However, the truss-side type of construction offers many points of superiority. Among them, as Mr. Stillwell points out, is a collision strength inherently greater than anything possible with side-girder designs, because with the latter there is always the tendency toward over-riding, thus crumpling up the light superstructure. This is, perhaps, of more importance on steam railroads than in electric railway operation, for the reason that one-car and two-car trains are the rule rather than the exception even on the high-speed interurban properties, and where trains are short and light the energy of collision impacts is quite easily dissipated. In fact, it is a long-standing axiom of steam locomotive engineers that in a collision where a light engine or engine and caboose are involved, the safest procedure is to stay in the cab rather than run the risks of jumping.

It would seem, therefore, that the feature of greater impact strength alone would hardly be a sufficient reason for the general desirability in electric service of the truss-side type of construction. Its dominating point of superiority seems rather to lie in its obvious ability to reduce weight and repairs, because the costs of the alternative types of construction are the same, and where one of the two offers the chance to effect a saving in weight, even though this be slight, there is an excellent reason for its adoption. In addition, there is a vastly increased rigidity with truss-side designs, and this prevents "weaving" of the body and working of the side posts at the window sills. Such relative movements in a composite structure like a car body are harmful enough with flexible wooden constructions, but with steel they permit the establishment of localized corrosion at the points where movements, however small, break the paint film or otherwise allow entrance of moisture between adjacent pieces of metal. When the motion is of sufficient amplitude, the great hardness of steel as compared with wood prevents any opportunity for "give" at the joints and may easily start rivets, which when once loose will certainly never tighten up again of their own accord.

Even with city cars, therefore, there is a clear-cut reason for preferring the truss-side to the side-girder design, though the latter may, with short car bodies, provide enough beam height for the required load without necessitating excessively thick plates. All that is required to establish the principle of truss-side construction and to utilize the potential compressive strength of the letterboard and roof—elements that have to be installed whether or not they are required to carry load—is to increase somewhat the longitudinal dimensions for the side posts over those now commonly used. When sufficient strength has been provided to take up the longitudinal shear existing between the top and bottom of the car side, there will have been eliminated the most obvious feature of weakness in steel car construction. This is the working of the posts. That it exists in practically every car with side-girder construction is not difficult to demonstrate, because merely by pressing a finger into the corner formed by the sash, post and window sill of a moving car when it rounds a curve one will find in nine cases out of ten that relative movement is taking place.

Putting the Railroad Man Right with the Public



Through Which End of the Telescope Do You Want the Public to Look at You?

Do the executives of electric railways loom as large and look as good as they really are? No; as a general rule, they do not.

They do not lay half enough cornerstones or address enough Fourth of July celebrations and June graduating classes or lead enough of the preparedness parades.

If they did, more people would know them and like them better.

Surely, there isn't anything about running a railroad that makes a man an unsocial individual.

Then why are there not more railway men among those who lead in the civic life of their communities?

One explanation is that more or less general distrust, not to say hostility, has kept railway men at arm's length from public affairs.

A few exceptions do not alter the truth of this general statement.

Railway executives will always be in this position until they take the trouble to show themselves AS THEY ARE—mainly big men who are making the most of a hard job.

Before the Civil War a lot of people in the South thought that Yankees had horns and a tail.

Afterwards it was found that this report was exaggerated, and now the people of North and South even hold each other in considerable esteem.

The same happy condition of affairs will obtain when it is discovered that railway presidents have no horns or caudal appendages.

But to effect this result it is necessary that they should show themselves.

If they are too busy frequently to pose in person, they can at least pose in print.

Where do most people get their impressions of people as well as things? From the newspapers.

Breaking into print, however, is no job for unassisted amateurs.

It is almost pathetic at times to see how small a big man looks in a newspaper statement.

No one would expect a lawyer to make a success as a master mechanic; then why expect a railroad man to be an expert in dealing with the public?

And even if he is, he is too close to his job to see it in its relations to the man in the street.

He overestimates the public knowledge for one thing. "Any idiot ought to know that," is a remark frequently heard when enlightenment of the public is under discussion.

Yet railway executives probably know as little about the packing industry, for example, as packers know about railroading.

Get a publicity man who knows how little the public knows and who thinks about what the public is thinking and feeling.

He can do as much toward PUTTING YOU RIGHT WITH THE PUBLIC as your best trial lawyer can do toward putting that accident case in the right light before the jury.

The two things are much the same; the main difference is in the size of the jury before which the publicity attorney argues his case.

1500-Volt Substation with Three 750-Volt Rotaries

New Substation of Salt Lake & Utah Railway Contains One Bank of Three Single-Phase Transformers and Three Rotaries—A Feature Is the Provision for Reliability with Reasonable Standby Equipment

BY M. R. LOTT
Electrical Engineer Salt Lake & Utah Railroad

UTAH SUBSTATION—ROUTE OF THE SALT LAKE & UTAH RAILROAD ALONG THE JORDAN CANYON AT THE NARROWS; WASATCH MOUNTAINS ARE IN THE DISTANCE

THE Salt Lake & Utah Railroad is a 1500-volt d.c. interurban line extending some 67 miles south from Salt Lake City, Utah, to Payson, the last section having been completed in June of the present year.* As the line has been extended and traffic increased it has been necessary to add to the number of substations. The Bringhurst substation, which the writer will describe, was the last one to be completed, and while the apparatus used is similar to that at the other substations a different arrangement has improved operating conditions over those existing at the original stations.

The service now consists of thirteen daily passenger trains each way, with considerable freight traffic. The passenger rolling stock comprises 44-ton all-steel cars, each equipped with four 115-hp., 750-volt motors. These are connected in two pairs, the motors of each pair being wired in series for operation on 1500 volts. A change-over switch mounted on the car allows all motors to be connected in parallel for full-speed operation on 750 volts. This connection is used when operating in Salt Lake City, or at times when it is desired to operate cars over the Salt Lake & Ogden Railroad, which is a 750-volt road connecting Salt Lake City with Ogden. They are geared for a free running speed of 55 m.p.h. Frequently two-car and three-car trains are operated, and at times four-car trains are run to care for special conditions.

The other three substations are at Granger, Lindon and Springville, and are respectively 5.8 miles, 38.7 miles and 53.4 miles from Salt Lake City. A No. 0000 copper trolley wire is used and the feeders are of the same size. Under normal conditions of operation all of the substations feed into the trolley wire, which is maintained continuous throughout the entire length of the road. Provisions are made, however, for sectionalizing the line in times of trouble. The normal rating of each substation is 500 kw.

Load conditions were the deciding factor in locating the substation at Bringhurst, 23.4 miles from Salt Lake City, approximately midway between Granger and Lindon substations. This location was also readily accessible for connection with some of the existing 44,000-volt lines of the Utah Power & Light Company, from which company 60-cycle power is purchased for the operation of the entire road.

General Features of Bringhurst Substation

The building is of brick, 52 ft. x 34 ft. in plan, with walls 18 ft. high. It is fireproof and has steel roof trusses and asbestos-covered corrugated iron roofing.

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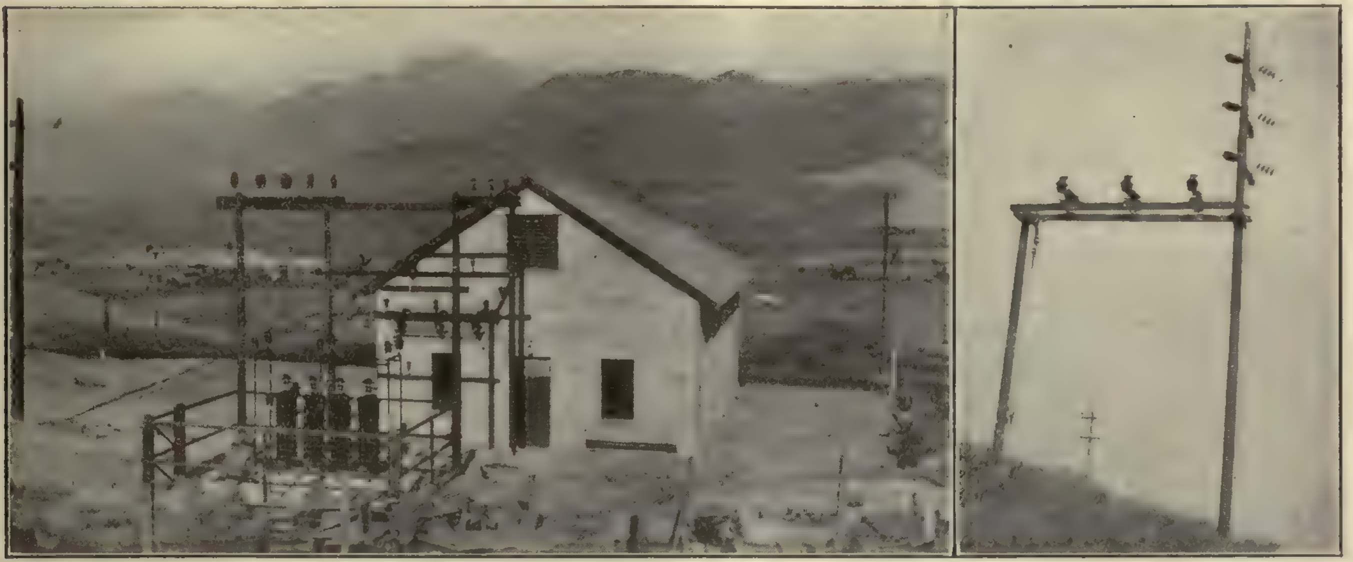
*See Electric Railway Journal, July 22, 1916, page 143.



UTAH SUBSTATION—BRINGHURST SUBSTATION OF SALT LAKE & UTAH RAILROAD, SHOWING INCOMING HIGH-TENSION LINES; ALSO THREE-PHASE AIR-BREAK SWITCHES AT POINT WHERE TAP LINE TO SUBSTATION CONNECTS WITH TRANSMISSION LINE

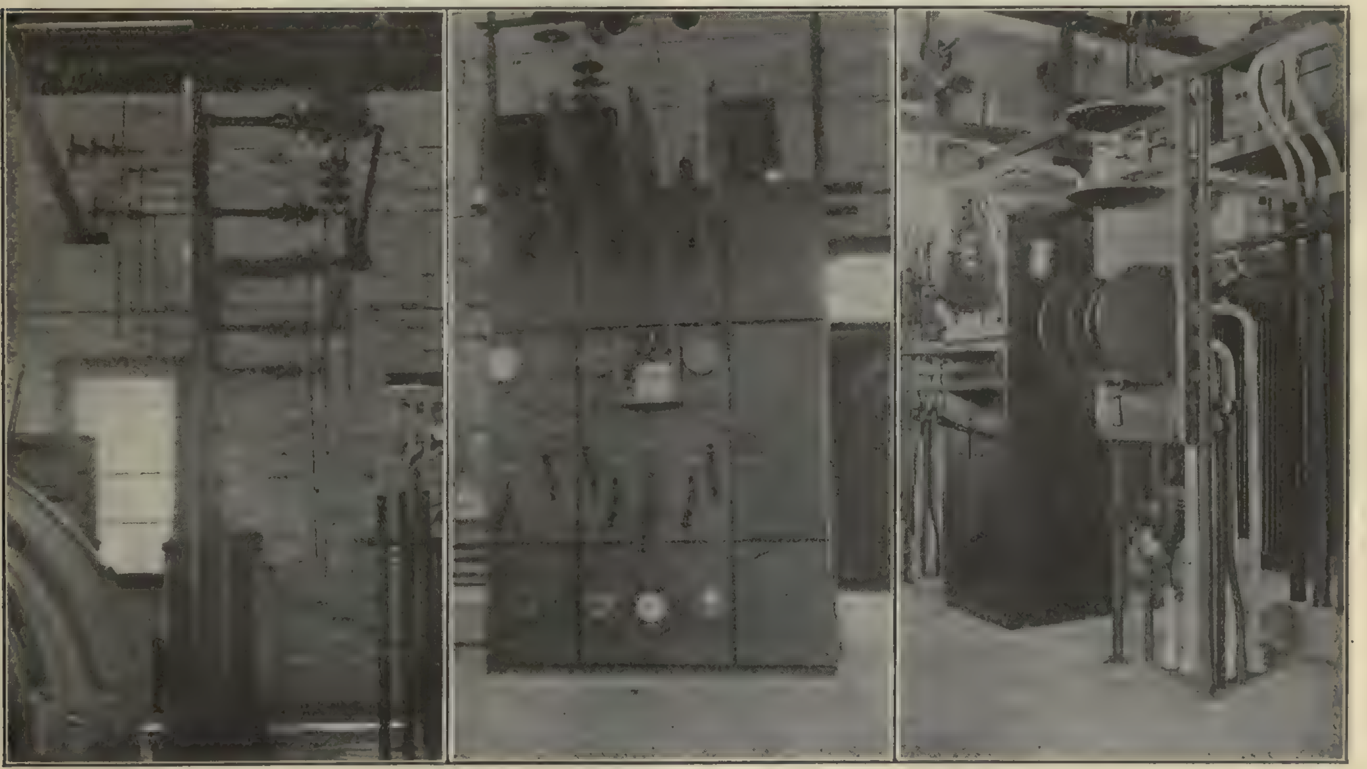
The energy is received from the Utah Power & Light Company's lines at 44,000 volts and delivered to the trolley line at 1500 volts d.c. through two 750-volt, 250-kw. rotaries connected in series. At present there are three rotaries installed with wiring so arranged that any two can be operated together. The station and switchboard will care for two additional rotary converters and the accompanying transformers, which will give the station an ultimate rated capacity of 1000 kw.

Conduits have been laid to care for the equalizing cables which will be necessary when the two sets of rotaries are operated in parallel. In the future installation, a three-pole breaker will be mounted on the negative panel to care for the three equalizer leads, and this breaker will be interlocked with either one of the four circuit breakers, so that on the opening of any of the main breakers the three-pole breaker will open and disconnect the two sets of converters.

All of the apparatus is placed in the one room and on the same floor level, and the operator has a small portable office provided with desk, telephone and an electric heater. An I-beam equipped with a chain hoist extends the full length of the building.

OUTDOOR APPARATUS

The Utah Power & Light Company's transmission line is approximately 200 ft. from the substation building. At the point of connection there is a switch rack equipped with an air-break switch to cut off the south end of the company's transmission line should trouble



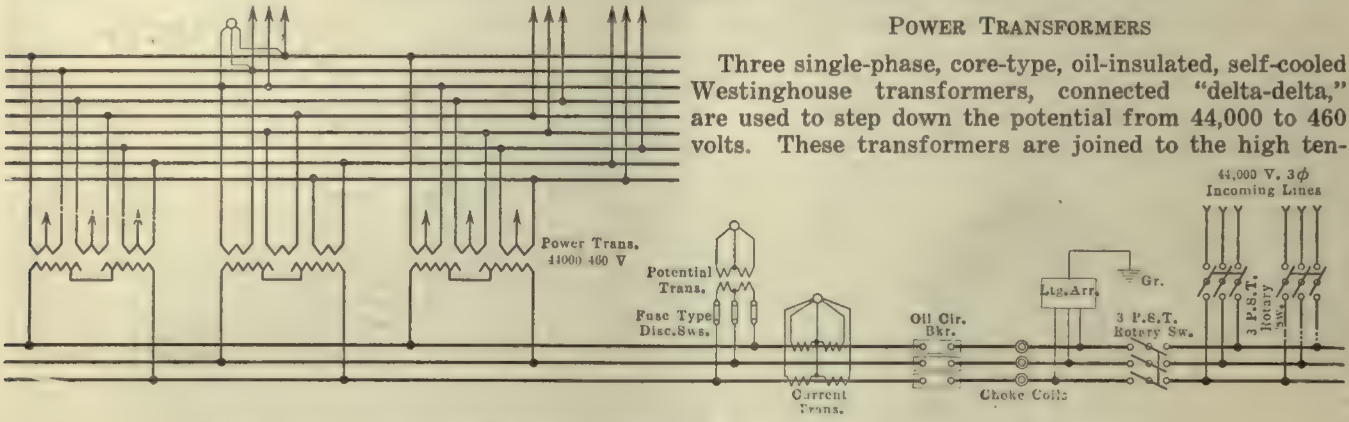
High-tension wiring, showing disconnecting switches and instrument transformers.

Front view of switchboard, showing rheostats mounted above and at rear of panels.

View of negative panel on the left and starting panel on the right.

UTAH SUBSTATION—THREE VIEWS OF INTERIOR SUBSTATION EQUIPMENT arise on that section. As the Utah Power & Light Company has a sectionalizing station about a mile north of the Bringhurst substation, this arrangement practically insures the same continuity as a loop-line service.

At the substation is another rack fitted with a similar switch to disconnect the substation wiring and lightning arresters from the tap line. Westinghouse electrolytic lightning arresters for the three-phase ungrounded neutral system are mounted on a concrete base and fenced in.



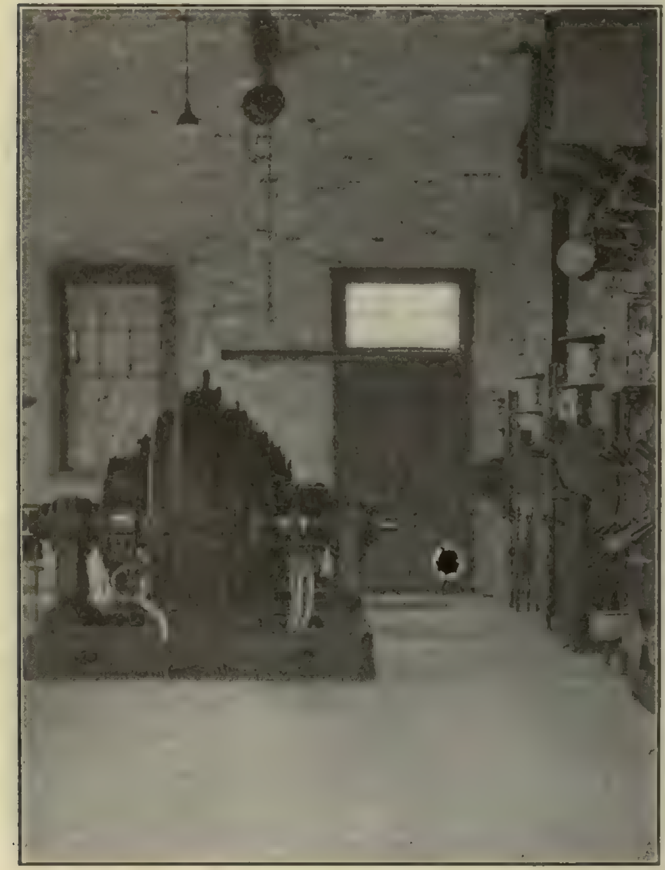
UTAH SUBSTATION—DIAGRAMMATIC LAYOUT OF HIGH-TENSION WIRING OF SUBSTATION

HIGH-TENSION STATION WIRING

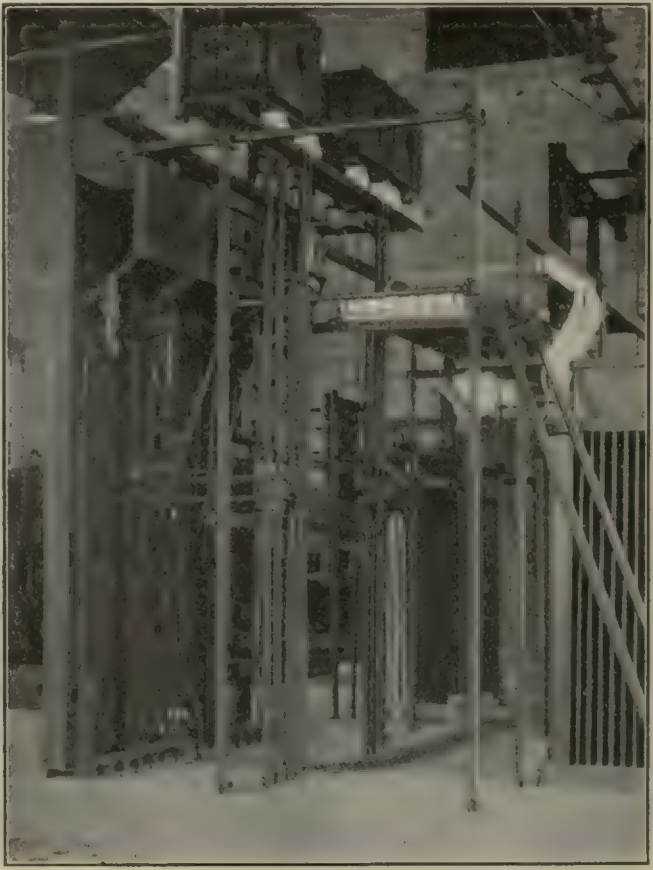
Pin-type insulators, mounted on pipe work, support the incoming high-tension conductors which enter the building through porcelain bushings. Immediately inside are aluminum choke coils connected by ¾-in. copper tubing to type GA hand-operated oil switches mounted on an elevated concrete base. Connection is thence made with the copper-tubing high-tension bus which extends the length of the building 15 ft. above the floor. The bus is supported at the ends by strings of three 10-in. strain insulators attached to structural steel supports, and from the roof trusses by means of suspension insulators.

POWER TRANSFORMERS

Three single-phase, core-type, oil-insulated, self-cooled Westinghouse transformers, connected "delta-delta," are used to step down the potential from 44,000 to 460 volts. These transformers are joined to the high tension bus through Dossert connectors so that a defective transformer may be readily disconnected to permit operation on "open delta." Each transformer has three separate secondary windings, having a capacity of 75 kva. each, one for each rotary. This arrangement provides for the operation of any two rotaries in series on the d.c. side. Adjusting taps are provided on the high-tension side so that full 460 volts low tension can always be secured. Taps are also provided on the low-tension side for starting the rotaries. Use is made of the 300-volt tap in starting the rotaries as induction



UTAH SUBSTATION—INTERIOR VIEW OF SUBSTATION, SHOWING ROTARY CONVERTERS, SWITCHBOARD AND STARTING PANELS



UTAH SUBSTATION—REAR OF SWITCHBOARD, SHOWING MOUNTING OF FIELD RHEOSTATS motors. Starting taps are actually brought out from two end transformers only, though connections can readily be made with the middle one should it be desired to use this with open delta operation.

ALTERNATING-CURRENT BUS STRUCTURE—LOW TENSION

Flat bare copper busbars, ⅛ in. x 3 in. in section, used for the low-tension circuit, are supported on a pipe framework 6 ft. 6 in. above the floor level. To provide for the operation of any two of the three rotary converters in series nine copper bars are employed, three for each secondary. Connection is made with the low-tension 500,000 circ.-mil cables by means of clamps. These cables are inclosed in 2-in. fiber conduit. The conduits are reinforced and protected by small concrete blocks extending 6 in. above the floor level. The conduit thus supported at the floor and attached by U-clamps to the pipe structure gives a neat appearance to the low-tension wiring.

ROTARY CONVERTERS

Each rotary has a continuous rating of 250 kw. at unity power factor, and a 50 per cent overload capacity for two hours. The momentary capacity is 300 per cent of normal load. The compound winding is so arranged that the series field tends to hold up the power factor on heavy loads and produce a slight increase in voltage. Since the transformers have high internal reactance a slight control of voltage is obtained through the operation of the field rheostats. Each rotary is provided with the usual a.c. starting panel mounted on a pipework frame.

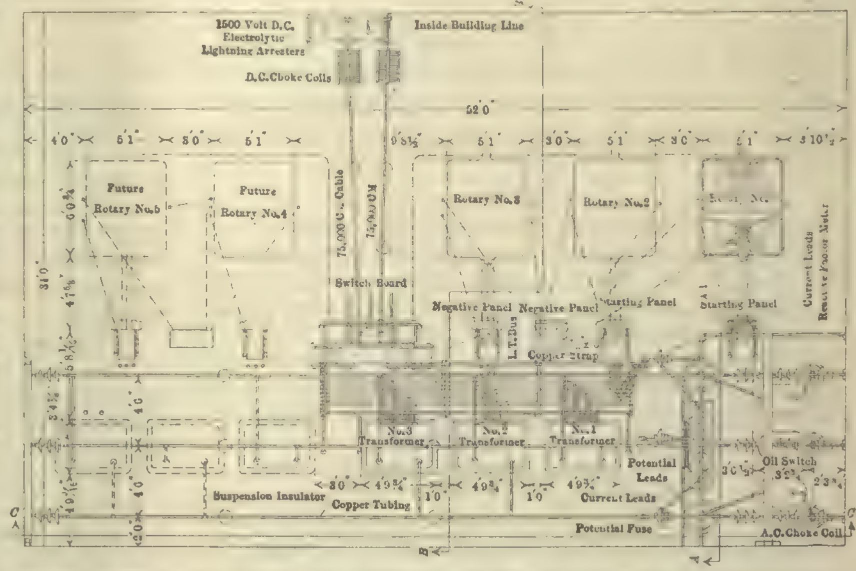
The connections which place any two of the three rotary converters in series on the d.c. side are made at the negative panel, which is placed between and in line with the starting panels for the second and third rotary converters. This panel is equipped with a triple-pole double-throw oil switch mounted on the back of the slate panel, and a single-pole knife switch mounted on the face. Any desired combination can be effected by means of these two switches. This panel also carries a carbon-break switch placed in the ground connection of the machines for additional protection.

SWITCHBOARD

The main switchboard is made up of three marble panels. The middle one carries the control for the incoming alternating current and outgoing direct current, together with a.c. energy measuring equipment, while the left-hand panel controls the connection to the d-c. bus from the present converters. The panel to the right is reserved for the future converters.

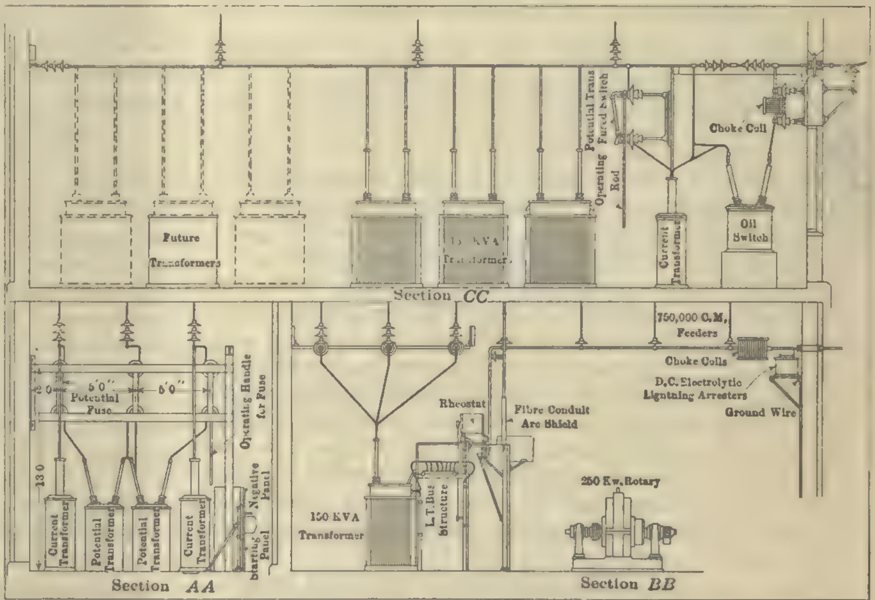
Carbon circuit breakers with adjustable overload trips are provided for the machine circuit, and the two d.c. feeders. The machine breakers have low-voltage release coils, and all these breakers are separated by transite barriers. Each feeder circuit and the machine circuit are provided with d.c. ammeters, and a reactive-factor meter is placed on the machine panel with plug connections. The current transformers for each converter are mounted on the starting panel for that machine, and the field rheostats are mounted on top of the pipe framework which supports the switchboard.

Under present conditions of operation it is aimed to set the rheostats so that the power factor will be unity at about 200-amp. load, as at this setting the power factor stays close to unity and the current is leading for greater loads. The normal rating of the machine is 333 amp. direct current.



UTAH SUBSTATION—PLAN OF SUBSTATION SHOWING LAYOUT OF APPARATUS

A d.c. voltmeter with a 2000-volt scale is provided with connections which permit voltage readings to be taken on each machine as well as on the feeder circuits.



UTAH SUBSTATION—SECTION ELEVATIONS OF SUBSTATION, SHOWING PORTIONS OF THE A. C. WIRING

As the payment for power is based on maximum demand as well as energy consumption, both integrating and graphic wattmeters are provided. The instrument transformers are placed in the 44,000-volt bus between the oil switches and the power transformers. The current transformers have each two secondary windings, one for the integrating wattmeter and the other for the graphic wattmeter and overload relay coils on the a.c. oil-switch circuits. All instrument wiring is of multi-colored cables placed in 1-in. iron conduits.

The d.c. feeders are 750,000 circ.-mil in cross-section and are suspended with Marlin hangers from a steel messenger wire. The d.c. circuit is protected by reverse current relays. Choke coils and electrolytic lightning arresters are installed on feeders at the entrances to the building. A summary of the a.c. protection apparatus is as follows: Lightning arresters with charging resistances and choke coils; condensers on low-tension busbars; overload relays acting on main oil switch, low-voltage on 44,000-volt oil switch; spark gaps on 44,000-volt current transformers, and fused disconnecting switches on 44,000-volt potential transformers.

LIGHTING

A 5-kw., 440-110-volt lighting transformer is installed to light the station, grounds and operator's cottage and to heat the operator's office. Four 200-watt units placed in deep-bowl reflectors are suspended 14 ft. above the floor over the rotary converters. The high-tension section of the building is lighted by five 60-watt bracket lights placed 12 ft. above the floor. Each lamp in this section is protected from static charges by means of a grounded wire lamp guard.

EQUIPMENT AND INSTALLATION

All of the equipment was supplied and erected by the Westinghouse Electric & Manufacturing Company according to plans prepared under the supervision of the writer. The total cost of substation building and equipment for the present installation was $58 per kilowatt of normal rated capacity. When the future installation is completed the cost will be about $39 per kilowatt.

Mayor Curley of Boston Issues Reasonable Orders Relating to Safeguarding at Drawbridges

Warning Devices Rather Than Foolproof Automatic Stops Are Specified for Immediate Installation—Study Is to Be Continued

FOLLOWING the preliminary conference on safeguarding at drawbridges held under Mayor Curley's auspices on Nov. 16, as described in the issue of the ELECTRIC RAILWAY JOURNAL for Nov. 25, 1916, page 1102, a second conference was held in the Mayor's office on Nov. 27. Representatives of the Boston Elevated Railway, Bay State Street Railway, Massachusetts Public Service Commission, Public Works Department and other bodies were present. Prof. Charles M. Spofford of the Massachusetts Institute of Technology, chairman of the engineering committee named to investigate safety methods, presented a preliminary report. As a result of its investigation the committee recommended the following immediate precautions, which Mayor Curley ordered placed in effect at once, following a unanimous vote in their favor:

1. That gates at all highway drawbridges be painted white with transverse black stripes maintained conspicuous at all times.
2. That on all highway drawbridges signs not less than 18 in. x 24 in., bearing the word "Stop" be installed, with black letters on a white background.
3. That at a proper distance from all highway drawbridge gates, lights be installed with reflectors so arranged that gates and signs shall be brightly illuminated when gates are closed.
4. That there be installed on all gates of highway drawbridges over which electric cars operate, at a proper distance above ground, powerful red lens lanterns, so located that when the gates are closed lanterns will hang at a proper elevation above the ground, directly between the two rails on each track, and drawtenders are to be required to keep these lamps burning from sunset to sunrise. Displaying sufficient warning lights for all other vehicular traffic is to be continued.
5. That at all highway drawbridges large gongs at a distance of not less than 100 ft. from each end of the draw span be installed, so interlocked with the drawbridge operating mechanism as to make it compulsory on the part of the drawbridge tender to close the circuit which causes the gong to ring before he can open the drawbridge, the gong to be designed to ring continuously while the draw is open.
6. That existing gates at highway drawbridges be substantially braced, guyed and strengthened and provided with such fastenings in the form of chains, cables or other devices, that when closed they will offer their maximum of resistance to vehicles colliding with them.
7. That on all highway drawbridges traversed by electric cars signs be installed directly over the car tracks, at a distance of approximately 100 ft. from the draw opening on each side, reading, "Slow Across Draw," such signs to be not less than 12 in. x 36 in., with black letters on a white background.
8. That an illuminated sign, not less than 12 in. x 36 in., reading "Stop When Draw Is Open," be installed at a distance of approximately 200 ft. from each highway drawbridge and the illuminating mechanism interlocked with the drawbridge and gong-operating mechanism.

No recommendation was made relative to the relocation of gates, as the committee asked for and received further time in which to study the advisability of establishing at each highway draw span a positive barrier that will absolutely stop all vehicles which may disregard such warnings as may be provided.

The committee has given careful consideration to the wisdom of installing derailing devices, and has concluded that the danger from derailment of electric cars to other vehicles standing at the side of the tracks, to foot passengers on sidewalks, and to passengers in the car which might thus be forced off the side of the bridge, is so great as to make such devices dangerous and impracticable. It has also considered the wisdom of automatically cutting off the power from electric cars at a reasonable distance from the draw span before the latter is opened, but feels that this might prove dangerous in case of failure of the brakes, as the motorman would then have no opportunity of controlling the car with his reverse. Copies of the committee's report are to be sent to all state bodies having charge of maintenance and operation of highway bridges. The report was also signed by Matthew C. Brush, president Boston Elevated Railway; T. T. H. Harwood, assistant engineer United States Engineer's office, Boston; John R. Rablin, chief engineer Metropolitan Park Commission, Boston; James D. Andrew, superintendent of station construction Edison Electric Illuminating Company of Boston; David Curtin, engineer maintenance of way Bay State Street Railway, Boston; and John E. Carty, secretary to the division engineer of the bridge and ferry division, Public Works Department, Boston.

In the first-aid cabinet used by the Beaver Valley Traction Company, New Brighton, Pa., individual brushes inclosed in sealed envelopes are provided for use in applying iodine. W. H. Boyce introduced this feature as an extra sanitary precaution.

C. E. R. A. Meets at Toledo

At the November Meeting of the Central Electric Railway Association Papers Were Presented on Headlights, Relations of the Public and the Electric Railways, Safety Campaigns, Freight and Express and Steel Car Construction

THE fall meeting of the Central Electric Railway Association, with about ninety railway officials and thirty manufacturers' representatives in attendance, was held at the Secor Hotel, Toledo, Ohio, Nov. 23 and 24. One of the features of the opening session was the response made by Henry L. Doherty to the address of welcome delivered by C. T. Laughton, in the absence of Mayor Charles M. Milroy. Mr. Doherty said he had had the pleasure of receiving many kinds of welcome from the city of Toledo, and had found that the people of the city had never welcomed or appreciated their street railway service until they were forced to do without it. He thought it was to be regretted that the people could not be made to realize their interest in the railways without having first to suffer their loss or a depreciated service. He told Mr. Laughton he was facing a group of the gamest men that could be found, because in the face of enormous increases in the prices of all supplies and materials and labor, they were still able to attend the convention with smiling faces, the only thing they feared being a rise in the price of red ink.

The public seems generally to think, Mr. Doherty continued, that the railways, steam or electric, are entitled to no profit outside of a certain limited return on the investment, but he asked what provision has been made to take care of the losses. With the public taking all the profits and the companies standing all the losses, there appears a reason why there has been no independent building of railways the last several years. The losses have been great. The railways have not been financially able to open up new country as fast as the population has grown, and the result is that the farmer in the great new areas under cultivation is able to market his produce only at a high cost. The public pays for the forced low transportation rates in high prices for food. What the industry needs is big men to put these matters before the public in the right light and make them see that the problems of the railways are their problems. The railway men should talk more and write more to bring about this proper enlightenment. There must come a change in public sentiment, and the man who sees it and leads it will indeed be the great leader. This thought Mr. Doherty submitted for all the politicians. The big problems of the railways, he said, are not in the technical side, but in the public relations side, and there is great need for some comprehensive joint and individual effort to bring about better relations.

Mr. Doherty then remarked that once he had been unable to get even a hearing at public meetings in Toledo, but that the people had come to understand through their personal experiences that railway problems were of vital importance to them, and his statements were now heard with interest. These, he said, are times when the government should not only refrain from further regulation, but should come in with a helping hand.

After Mr. Doherty's remarks, upon call of President Benham, the minutes of the previous meeting were read by Secretary Neereamer, and they were approved as read. An amendment to the constitution was passed to the effect that the president and two vice-presidents shall each be elected from different states.

DISCUSSION ON HEADLIGHTS

A paper on headlights by K. W. Mackall and discussion on the subject occupied the balance of the morning session. This paper is published in abstract on another page. The discussion was opened with an inquiry about the relative properties of the parabolic reflector and the semaphore lens, to which Mr. Mackall replied that the former should not be used at all with the luminous-arc type of headlight, because the fumes from the electrodes were kept almost wholly within the parabolic reflector, which extends almost completely around the arc. Semaphore lenses may be put in headlights formerly using reflectors by simply substituting the lens for the glass in the door in one type and in another type by putting on a new door to bring the lamp and lens in proper position for focus. While the lens utilizes only a sector of the light flux as compared with almost total utilization of all the light with the parabolic reflector, yet a lens placed 7 in. from the light source projects a narrower beam of greater intensity than given by a reflector. With equal amounts of light flux used for both types of headlights, the intensity of the beam down the track is two to one in favor of the lens, because the concentration of the rays is more perfect than with the reflector.

S. R. Dunbar, Anderson, Ind., said that the type of headlight which should be used by a road depended on whether one wanted concentration, spread or distant projection. He thought it essential to have more or less spread of light, particularly on curves, as a means for attracting attention of vehicles approaching from the side of the track. Few accidents occur from objects lying on the track; most of them are caused by people going across the track.

Mr. Mackall said that the optical semaphore lens illuminated the whole roadway at a distance of 1000 ft. This, he thought, constitutes sufficient spread, and the intensity is retained. It is impossible to have both spread and distant lighting. The choice is a matter largely to be settled by personal preference and by the character of the particular road.

The best location for the headlight, whether above or below the motorman's plane of vision, was then discussed at length, but the arguments and experiences expressed seemed to be as conclusive for one way as the other. C. L. Henry summed the matter up with the conclusion that at distances of 1200 ft. or 1500 ft. a headlight location 3 ft. above the motorman would be practically equivalent to one 3 ft. below him, because the rays would be practically parallel from the two positions. This matter was discussed also by Mr. Mackall, F. N. Norviel, F. W. Coen, H. A. Nicholl, G. H. Kelsay, S. R. Dunbar, President Benham and J. H. Drew.

The afternoon session was devoted to the presentation and discussion of papers entitled "The Electric Railway Industry," by F. R. Coates, president Toledo Railways & Light Company; "Safety," by Harold W. Clapp, general superintendent Columbus Railway, Light & Power Company, and "Electric Railway Freight and

Express," by Nathan Rumney, general freight and express agent Detroit United Railway. After giving a short history of the industry, Mr. Coates referred to the recent increase in the cost of materials used by railway companies. The three principal items in electric railway use, according to Mr. Coates, are labor, copper and coal, but, in the past twelve months, on an average, labor has increased in price 20 per cent, copper 100 per cent, and coal, when bought in the open market, 200 per cent. Mr. Coates then called attention to the dependence of the public upon the continued operation of the utilities and suggested that these utilities and the steam railroads should be preferred, for this reason, when shipments of coal are being considered. He then read a paper on public relations, which was the same as that presented by him at the Doherty Managers' Meeting in Toledo last October and contained the ten basic principles of public relations, as he understood them. These principles were published on page 867 of the issue of this journal for Oct. 21, 1916, in connection with a report of the Doherty meeting, but the full paper is given in this issue. An abstract of the paper by Mr. Rumney on freight and express traffic is also published.

The discussion was opened by Terence Scullin, Cleveland, Ohio, who said, in commenting on Mr. Coates' paper, that the citizens of Toledo are to be congratulated because their railway company is now putting into service a large number of cars of the best type in existence to-day. He referred to the new, front-entrance, center-exit cars just placed in service.

SAFETY CAMPAIGNS

E. R. Kelsey, Toledo, Ohio, then told how the safety work in Toledo is carried by two safety supervisors, of whom one is responsible for the safety of the employees and the other for the safety of the public. The company has been doing a great deal of work in the schools and started out last year to have a talk on safety given in every schoolroom. A film, named "The Price of Thoughtlessness," had been shown very widely also, and the result of this work in the schools has been that accidents to children have been almost eliminated. At present, however, the company is disturbed over the number of automobile accidents, having had an increase of almost 80 per cent in this kind of accidents during the last year. A campaign is being conducted by using the window space in the cars for a series of photographs showing actual accidents and indicating the losses due to them. The results of this particular work are not yet known.

In general, the work among the children has fostered a friendly spirit between the parents and the company and has greatly improved the sentiment of the whole community toward the railway. As evidence of this, as well as the value of taking the public into the confidence of the railways, Mr. Kelsey remarked that 67 per cent of the public of Toledo, after one city administration had passed a 3-cent fare ordinance to embarrass its successors, had chosen to pay a nickel rather than ride for nothing. This was after the company had put squarely up to the public through purchased newspaper space why it could not carry passengers for 3 cents and had offered to carry anyone free rather than accept less than a 5-cent fare. Mr. Kelsey also pointed out the importance of having the highest officers easily accessible to the public and said that, as soon as the public finds the doors open to complaints, there is no longer a desire to kick. He considered that car window advertising is the most valuable tool a company has.

H. A. Nicholl, Anderson, Ind., then described briefly the work of the Union Traction Company of Indiana in promoting safety. This had been confined very largely to the employees, where a splendid showing had been made, the company having been awarded the Brady safety medal last year. Efforts are being directed especially toward keeping up the interest in the movement, and the enthusiasm of the employees in safety work, which was somewhat inclined to waver, was maintained by two safety banquets a year. At these banquets contest papers are read and speeches are made by the men and officers of the company. At the next banquet, for example, H. L. Brownell, safety engineer, is to give one of his safety lectures illustrated with motion pictures.

Following this, Mr. Clapp was asked how he had been able to bring about the 33-per cent reduction in insurance rates that was cited in his paper. In explanation he stated that the original rate had been 75 cents and the company was facing an increase to $1.05. In consequence, a proposal for co-operative action was made to the Ohio Inspection Bureau with the aim of finding a way to cut the increased rate, which the company did not propose to pay. Two of the bureau's experts and two department heads of the company then went through the company's plant, and as a result, in a year's time the company spent $9,500 in placing its property in shape to meet the recommendations and requirements of the bureau. Fire walls were built higher, fire doors installed, sand and water buckets provided wherever they were wanted, and all wiring strung in a way that inspectors would pass without penalizing. The head of one department was appointed to make a monthly inspection of the property to see that every nook and corner was kept absolutely free from rubbish. Also, four surprise inspections each year by the Ohio Inspection Bureau were requested. The result was a lowering of the rate to less than 50 cents per $1,000. A company, Mr. Clapp continued, must first put its house in order and train its own employees and after that go out and talk to the public. The bonus system seemed to be the answer to keeping up the interest of employees in safety work. He had used $1,000 for this purpose last year and intended to go in for bigger bonuses next year. The way to reap best results from the safety endeavor was to work from the inside out.

Regarding public relations, Mr. Clapp said that if a company treats the public right it will get suggestions rather than kicks. That is what the company is getting in Columbus. To make it easy for the public to receive attention and gain ready access to the office of the general superintendent, he has a push button in his outer office and a sign reading: "If you don't receive prompt attention, push this button." This rings a bell in his office, and as a result callers received prompt attention. No conference, he said, is too important for him to leave to meet any of the public.

ELECTRIC RAILWAY FREIGHT

Charles L. Henry, Indianapolis, Ind., was then called upon by the chair. He said there was no question but that electric railways must look to freight traffic rather than passenger traffic for any large increases in volume of business, and recalled that in the year 1893, when he had made a contract for carrying carload freight into Indianapolis, it was prophesied that the time would come when a large amount of the transportation of farm products into the cities would be by electric lines. The railways have had to face a prejudice against the bringing of freight over the city streets although they use clean, closed electric cars, whereas evil-smelling, littering wagons are permitted on the same streets at all hours of the day. The electric railways could save the communities they serve thousands of dollars if the people could be made to view the matter in the right light and see the great economic value of permitting the movement of freight cars over the streets during the night. If produce could be brought into the Indianapolis markets by trolley it would not disturb traffic one-tenth as much as to bring in the same produce by wagon.

The papers of the afternoon were also discussed briefly by F. D. Carpenter and J. F. Starkey. Prior to the conclusion of the session the executive committee stated that it had been decided to hold the annual meeting in Indianapolis in February.

On Thursday evening the delegates attending the meeting were made the guests of F. R. Coates, president Toledo Railway & Light Company, at a theater party.

At the opening of the session on Friday morning Mr. Kelsey displayed the previously-mentioned film entitled "The Price of Thoughtlessness," which the Toledo Railways & Light Company had shown in conjunction with a lecture in every schoolroom in Toledo, and which had resulted in almost complete elimination of accidents to children. Mr. Kelsey gave part of his talk as ordinarily delivered to the children and said that while the company was showing this film in the schools, volumes of letters had been received from parents thanking the company for the lesson that was being conveyed to their children. One of these letters was from a man who had four children, each of whom without exception had come home and told him the complete story of what they had seen and warned him against the dangers of the street. At these lectures a safety button was given to each child, and added interest was created in the buttons by numbering them and having a few duplicate numbers. Then if any child found another button with the same number as his own, the company gave a reward of $1 when the two buttons were presented by the two children.

After this F. W. Coen read a paper, saying when introducing it, that it was also on safety first, but from another viewpoint. This was published in abstract in last week's issue. At the conclusion, L. B. Stillwell's paper on car construction, which was abstracted in last week's issue, was read by F. M. Brinckerhoff of the firm of L. B. Stillwell, consulting engineers. A joint discussion of both the foregoing papers then took place.

F. D. Carpenter, president, Fostoria & Fremont Railway, discussing Mr. Coen's paper, pointed out the necessity for properly posting the lawmakers on matters which concern the railway properties. He thought that the passing of some of the laws which are injurious to the railway companies was due largely to the ignorance of the legislators and that the railway men ought to be very active in making sure that the proposed bills are read by the men affected as well as that the legislators understand the full significance of any proposed measure. There was need for work in this direction. Railway men in general had been lame in not undertaking to educate the public as to the actual operation of the railway properties. He entreated everyone to go home and create some more favorable sentiment.

Mr. Coates suggested that the executive committee of the association appoint a committee to consider the advisability of having a series of talks given to the public, and of distributing suitable posters and carrying car advertising for the education and information of the public, the plan being to have the same thoughts expressed simultaneously throughout the Central Electric Railway Association territory. President Benham thought this was a good suggestion and said he would put the matter before the executive committee.

In the discussion of Mr. Stillwell's paper, G. H. Kelsey, Anderson, Ind., asked about the relation of car weight to ease of riding, stating that it is common to hear the expression that a heavy car is easy riding. Mr. Brinckerhoff answered by saying that it was to a certain extent true that the heavier car rode easier, due to the fact that the inertia of the great mass was, of course, harder to overcome and hence less susceptible to the quick motion of the trucks. These same easy-riding qualities can be obtained, however, with the lighter weight car by using long soft elliptic springs. He said that the all-steel, truss-side construction cars described in his paper weighed 10,000 lb. less than the old steel-underframe wooden cars of the same dimensions, and were lighter per seated passenger, per foot of length, or under any basis of comparison. Yet particularly good riding qualities had been obtained through the use of a special truck frame permitting of the mounting of 42-in. elliptic springs. In the ordinary truck only 34-in. springs can be installed. He said that great mass in a car did not necessarily signify strength, but that strength was obtained through the proper association of members rather than weight of members.

Clarence Renshaw, Westinghouse Electric & Manufacturing Company, asked Mr. Brinckerhoff if he had ever arrived at any particular relation between car weight and speed of operation. Mr. Brinckerhoff thought there was no reason why a car should leave the track because it was light, and said there was a more direct relation between the weight of a car to carry a certain weight of equipment. Mr. Renshaw said there seemed to be a general impression for ordinary track conditions that a car for operation at 50 m.p.h. or 60 m.p.h. should have a minimum weight between 35 tons and 40 tons.

Mr. Brinckerhoff said the light car could be run at high speed more safely than the heavy car, basing his opinion on the consideration that, once a moving, spring-supported mass is seriously disturbed, the resulting oscillation is more serious with a heavy car than with a light weight car. There is always a close relation between truck-center distance and riding qualities, the longer truck centers tending toward steadier riding. He cited an instance of some cars on one road which were 33 ft. long between truck centers, and although these had a very bad nosing characteristic at 30 m.p.h., they rode smoothly at 40 m.p.h. and nosed badly again at 54 m.p.h. These cars weighed 70,000 lb. The phenomenon was partly due to wrongly-hung swing links. When asked how much weight would be added to a steel car by increasing its length from 48 ft. to 60 ft., Mr. Brinkerhoff said that 10,000 lb. would probably cover the difference.

C. L. Henry, president, Indianapolis & Cincinnati Traction Company, was very firmly of the opinion that the greater mass would tend to keep the car on the track, the greater inertia holding the wheels more firmly to the rails over track inequalities. His cars, he said, are heavy—undoubtedly too heavy—but he had never had a car derailed, exclusive of collisions and derailments at switch points, in twelve years of operation. He did not believe it possible to derail a heavy car as easily as a light one.

Walter Evans, United States Metal & Manufacturing Company, pointed out that Mr. Stillwell's paper dealt very largely with car construction for train operation and that a car running individually had very different riding characteristics than when operating in a train. He said the electric railways had adopted a good many features from the steam roads which added materially to the weight without adding to the comfort. Referring to the all-steel truss-side construction cars shown by Mr. Brinkerhoff, he said they gave him the impression of being rather top heavy, or the bottom too light for the balance of the car body. He said they used to load the bottom of steam-road coaches with steel rails in order to make the center of gravity lower. This tended toward easy riding and also resisted telescoping of the cars in collisions.

Mr. Evans, in commenting on Mr. Coen's paper, said that in his experience legislators were for the most part open-minded in receiving information regarding proposed legislation from the electric railway men. He thought it very advisable that individual effort be made to become acquainted with the members of the legislature, and that this personal effort would go a long way toward correcting unfavorable regulation.

Mr. Henry then asked about the durability of all-steel cars and the likelihood of rusting becoming a serious matter in the life of all-steel equipment. Mr. Brinckerhoff answered that this was a matter of maintenance; that the life of a car is the life of the joint which must be developed in excess of the strength of the members it connects. If motion is once started in a joint, the car will very rapidly deteriorate, since it is impossible to get at the rivets and tighten them up again. To prevent rusting in the joints they must be thoroughly painted when put together, and hence the matter is largely one of workmanship. Then the steel, and especially the joints, must be kept painted, or corrosion will take place. Some metals such as ingot iron are more resistant to rust than others, and if the metal is properly selected there need be no great difficulty in eliminating rust. The extra money spent in the material is more than compensated for by the added life.

Referring to Mr. Evans' comments on the top-heavy appearance of the cars, Mr. Brinckerhoff said that the center of gravity had been raised by this side girder construction only 2 in. The company for which these cars were built, figured a resultant saving of $800 a year per car in coal bills, and found also that there was a saving of one new locomotive for every ten cars built, since the old locomotives which were in operation were large enough to haul a ten-car train of these cars, but would not have been for ten cars of wooden construction. Hence, with locomotives costing $25,000 each, the use of wooden cars would have added an indirect charge of $2,500 per car for locomotives alone. Keeping the weight of the car down, therefore, also kept down the first cost.

Some comment was then made on the relative cost of all-steel and steel-underframe wooden cars. Mr. Coen said that his company had some all-steel, 60-ft. interurban cars equipped with 100-hp. motors and train control, weighing 80,000 lb. and having a seating capacity for sixty-four people, and that when these cars were purchased one year ago the price was considered to be less than the cost of the same car in wood.

At the close of the meeting President Benham appointed the following nominating committee to nominate a president, vice-president and members of the executive committee, and to report at the annual meeting to be held in Indianapolis, Feb. 22 and 23: F. D. Carpenter, chairman, and C. L. Henry, C. E. Morgan, S. D. Hutchins and W. H. Bloss.

SPECIAL CAR FROM INDIANAPOLIS TO CONVENTION

A party of fifteen railway men, including C. L. Henry, E. B. Peck and A. L. Neereamer, made the trip to the meeting from Indianapolis through to Toledo on a special car. The group was augmented by other railway officials at various points along the route, so that some thirty-five members stepped from the car at its destination. The trip was made by way of the Terre Haute, Indianapolis & Eastern Traction Company to Richmond, the Ohio Electric Railway to Dayton, the Dayton & Troy Electric Railway to Piqua, the Western Ohio Railway to Lima, and the Ohio Electric Railway to Toledo. Luncheon was served from Richmond on. At Toledo, one of the Toledo Railways & Light Company's new front-entrance, center-exit, low-floor cars served as the special car to take the delegation from the interurban station to the Secor Hotel. The 262-mile run from Indianapolis was made in 9 hours and 30 minutes, the car leaving Indianapolis at 9 a. m. and arriving at Toledo at 6.30 p. m. A special car from Toledo to Indianapolis made the return trip Saturday morning and Mr. Coates provided a special city car to convey the members from the hotel to the interurban depot.

Freight and Express Traffic*

Increased Freight and Express Service Will Make Electric Railways More Useful

BY NATHAN RUMNEY

General Freight and Express Agent Detroit (Mich.) United Railway

WITH most lines the development of the freight and express business was somewhat slow. The lean years following the efforts of those who undertook to build it up were most discouraging, but persistent efforts were finally rewarded. It can now safely be stated that this branch of electric railway service has proved to be a valuable asset to the community, if not an actual necessity in the development of present-day commerce.

While at first the attention of the railways was confined solely to the development of the local business along their own lines, the addition of connecting electric lines at various points brought about an interchange of freight between these lines, and through routes and rates were eventually established. In this the various associations of the electric lines played a prominent part, and to them the present free interchange of both passenger and freight business can be largely accredited.

On many of the lines, particularly those having access to a large city, the transportation of milk and cream has been extensively developed. For obvious reasons this should prove to be a particularly desirable class of business, although to make it successful it is absolutely necessary that a regular schedule be maintained. Experience has demonstrated the desirability of cultivating the dairy industry as far away from the large centers of population as possible. At the rate of present-day development the lapse of a few years may largely increase the area of a city, making the land immediately adjoining too valuable for dairy purposes. In some cases refrigerator cars are now being operated, and it is not improbable that this method of transporting milk will be more generally adopted in the future.

Different views have been, and still are, held as to whether the traffic was more profitably handled as a purely freight business, or on the old-line express basis. In general, the electric lines are committed to the freight business, and this field appears to hold out a greater opportunity for future development. Between large cities or industrial centers, however, there seems to be no good reason why an express business should not be a paying investment, but a freight business would undoubtedly also prove successful.

The freight business on electric lines has been looked upon largely as a package or less-than-carload business, and this is still true to a large extent. To take proper care of this class of business adequate warehouse facilities are essential. At the larger terminals a number of the lines have entirely outgrown their facilities, and as a result are experiencing a continual congestion. Just what this means in additional cost for labor and claims for loss and damage, many know. In dealing with these congestions, electric lines are confronted with entirely different conditions than those encountered by their steam road contemporaries. The latter with their larger freight car equipment are in a position to keep their loaded merchandise cars outside until such time as room is available in the warehouse for unloading them. On the other hand, freight cars on most electric lines are usually at a premium, or at least they have been in the past. The cars which enter a station with inbound merchandise or less-than-carload freight must be immediately unloaded in order that they may be available for loading outbound freight.

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*Abstract of paper read at Toledo meeting of C. E. R. A., Nov. 23-24.

The despatch afforded freight business on electric lines approaches more nearly the service of the old-line express companies. In fact, as far as the less-than-carload business is concerned, it may properly be classed as express service, minus the pick-up and delivery features. An example of this is furnished in two-carrier service between two cities separated by a distance of more than 200 miles. The merchandise run leaves one terminal about 2 p. m., and cars arrive at the other terminal in time to effect delivery of freight by 9 a. m. the following day. This may be exceptional, but points located on the same line are invariably served with over-night delivery.

By reason of the nature of the freight business conducted by electric lines and the conditions under which they operate, much discussion has been provoked among the lines themselves as to the proper basis of rates applicable to the traffic. Without venturing too far into a discussion of the merits of the question at this time, I desire to express the hope that in addition to the usual items of value, weight, bulk and risk, the service rendered by electric lines may be seriously considered as a factor in determining the rates.

Reference has been made from time to time to the competition afforded by electric lines to the steam roads. There may even have been some animosity existing between the two factions at first, but if such feeling did exist it has gradually been eliminated. The freight departments of the electric lines have a field distinctly their own, and the day is not far distant when they will serve as valuable feeders for the steam roads. At least the friendly relations which now for the most part obtain between the officials of the steam and electric lines augur well for the future.

With the express or less-than-carload freight business well under way, as it is at present on most lines, the tendency should be toward the development of traffic in car lots—not only that which is to be secured in local movement, but also that which moves in interchange with connecting electric and steam lines. Bulk commodities such as sand, gravel, stone, brick, ice, etc., also offer a means of increasing revenues. Even city lines under proper franchise conditions may participate in transportation of certain bulk commodities which could be moved at night, and thereby utilize equipment now called into use for the most part during the daytime only. In many cases refuse, garbage, etc., might be transported through arrangement with the civic authorities.

Even if the passenger business on most electric lines is of paramount importance, it is but fair to say that the freight and express business in some form or other can be made a valuable adjunct, the extent to which it can be developed depending largely upon the financial and operating conditions. With the attainment of full development the usefulness of electric railways in the community will be manifestly increased, and to this development the express and freight department will contribute in no small measure.

Headlights*

A Comprehensive Survey of the Practice and Theory of Illumination as Applied to This Phase of the Subject

BY K. W. MACKALL
Electrical Engineer Ohio Brass Company, Mansfield, Ohio.

HEADLIGHT service is divided into three classes, each marked by different service requirements as follows: City service, slow speed; city and suburban service, moderate speed, and interurban service, high speed. Each class of service requires a different type of headlight.

In ordinary city service cars as a rule operate on well-lighted streets and a powerful headlight is not required. The prime objects of the headlight for this service are to warn of the car's approach and to illuminate switch points. For these purposes the dash-type headlights are entirely satisfactory.

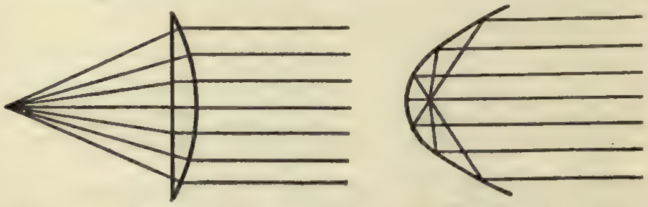
Fig. 1 Fig. 2

LIGHT RAYS UNDER IDEAL CONDITIONS—FIG. 1, WITH LENS; FIG. 2, WITH PARABOLIC REFLECTOR

Cars which run from the main business centers to outlying suburban districts require more powerful headlights. For this service a small 2-amp. luminous arc headlight or an incandescent headlight with about a 9-in. reflector equipped with a focus-type Mazda lamp gives the desired results.

For interurban service it is desirable that the headlight illuminate the track a sufficient distance ahead of the car to enable the motorman to see an obstruction and stop the car before striking it, and also to warn vehicle drivers and pedestrians approaching on intersecting highways. For this high-speed service the luminous-arc headlight is perhaps best suited owing to its high power, reliability and low maintenance cost. The carbon-arc headlight is also used extensively, and within the past year or two the incandescent headlight has gained some prominence in this field. The last-named is, however, subject to the limitation that it does not operate satisfactorily on widely fluctuating voltages. Storage-battery headlights have also been tried out, but

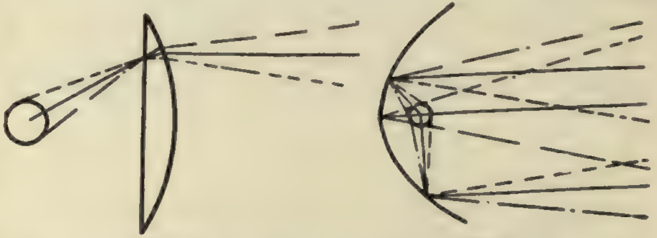
Fig. 3 Fig. 4

LIGHT RAYS UNDER PRACTICAL CONDITIONS—FIG. 3, WITH LENS; FIG. 4, WITH PARABOLIC REFLECTOR have been abandoned in all but a very few isolated cases owing to the high initial and maintenance cost of a satisfactory storage-battery equipment.

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*Abstract of paper read at Toledo meeting of C. E. R. A., Nov. 23-24.

CHARACTERISTICS OF THE SEVERAL TYPES OF HEADLIGHTS

The luminous-arc headlight is the most efficient of all types available. Its maintenance cost is very low. By simply reversing its polarity, an inefficient light is produced which permits the use of this headlight on city streets. Sometimes it is provided with an auxiliary circuit of two incandescent lamps in series with resistance for operation on city streets. As the upper electrode is practically non-consuming, the arc is always maintained at the focal point of the lens or reflector.

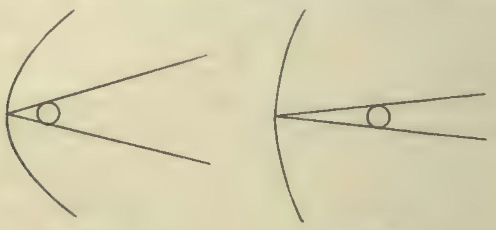
Fig. 5 Fig. 6

DIAGRAMS SHOWING EFFECT OF FOCAL LENGTH ON DIVERGENCE OF LIGHT BEAM—FIG. 5, SHORT FOCUS; FIG. 6, LONG FOCUS

The luminous-arc headlight has the disadvantages that fumes are given off from the arc; that it is not quite as simple as an incandescent headlight, and that the natural travel of the arc around the electrodes causes the beam to wander slightly from side to side. However, its many advantages more than offset these disadvantages. Poor illumination from luminous-arc headlights is caused by lack of proper care of the upper electrode, which should be adjusted every two or three months.

Carbon-arc headlights are of low initial cost and no fumes are given off by the arc to cloud the reflector or lens. Dimming for city service is accomplished by using an auxiliary circuit of incandescent lamps or a screen dimmer. They are reliable and require little attention to the operating mechanism. However, the efficiency is low and the maintenance cost high as compared with the luminous-arc headlights.

The incandescent headlight is simple and steady, and in the smaller sizes the maintenance cost is somewhat less than the arc headlights. An incandescent lamp, whether it is used in a headlight or not, is very susceptible to fluctuations in voltage since the illumination varies as about the cube of the voltage.

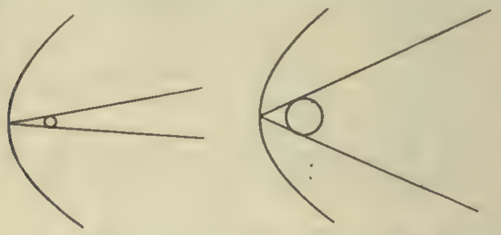
Fig. 7 Fig. 8

DIAGRAMS SHOWING EFFECT OF SIZE OF LIGHT SOURCE—FIG. 7, SMALL SOURCE; FIG. 8, LARGE SOURCE

It is out of the question to use high-powered incandescent headlights in series with resistance on 1200-volt trolley circuits, because when a lamp fails an arc will be established between the leading-in wires of the lamp and burn down into the base and receptacle with a strong possibility of starting a fire. The incandescent headlight is considerably more fragile than an arc headlight, and the constant vibration to which incandescent lamps are subjected in actual service makes their operation uncertain in interurban work.

THEORY OF HEADLIGHTS

A headlight consists of two principal parts, a primary light source and a reflecting or refracting medium. For redirecting the rays of light to form a beam, we may use either a parabolic reflector or a refracting lens. Under the ideal conditions of the light emanating from a point and the lens or reflector being perfect, the actions of a lens and a parabolic reflector are as shown in Figs. 1 and 2 respectively.

Figs. 3 and 4 show respectively the actions of a light source of appreciable size on a lens and a parabolic reflector. A cone of light strikes each small surface of the lens or reflector and is reflected or refracted as a cone of light, the angle of divergence of which is exactly equal to the angle subtended by the light source itself. The effect of focal length upon the angle of divergence of a beam is shown in Figs. 5 and 6, which represent two parabolic reflectors of equal diameters but different focal lengths.

The intensity of illumination given by any headlight depends upon the following: Concentration of the primary light sources at the focal point of the lens or reflector; shape and condition of the reflecting or refracting medium, and candle-power of the light source.

Figs. 7 and 8 illustrate the effect of concentration of the light source. These represent two reflectors of equal diameter and focal length, but in one case a small light source is used, resulting in a narrow beam of light, while in the other the large light source produces a beam of considerable divergence.

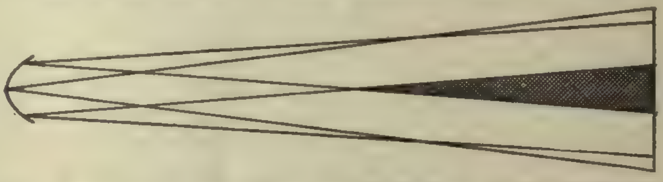
FIG. 9—DIAGRAM SHOWING CONCENTRATION AND DIFFUSION OF LIGHT RAYS BY REFLECTOR

If the reflector is tarnished or the lens is dirty light which would otherwise be transmitted is absorbed. If the reflector or lens is not true, the beam will be more divergent and of less intensity. It is also perfectly obvious that if the reflectors are equal in efficiency and have the same dimensions, the higher the intensity of the light source the higher will be the intensity of the projected beam.

Fig. 9 shows how the entire beam of a headlight is made up. The center of the reflector is the most inefficient part, while the main beam (the shaded section), which is useful for long-range illumination comes from the outer portions of the reflector. If it is desired to use a combination lens and reflector a spherical reflector should be used.

MERITS OF DIFFERENT REFLECTORS

From the standpoint of efficiency for light projection, reflectors can be arranged in the following order, that having the highest coefficient of reflection being placed at the top of the list: Silver-plated copper, clear plate-glass mirror, canary glass mirror, nickel-plated copper and polished aluminum.

The coefficient of reflection, however, is not the only element to be considered in selecting a reflector. The following order is that of relative permanency of reflecting surface: Clear glass and canary glass, nickel-plated copper, silver-plated copper and polished aluminum.

Arranged in order of initial cost the list appears thus: Polished aluminum, nickel-plated copper, silver-plated copper, clear glass and canary glass.

MERITS OF DIFFERENT TYPES OF LENSES

There are three types of semaphore lenses which are used in headlights, for the most part in connection with luminous-arc headlights. So far as I know no carbon-arc headlight is in use to-day with anything but a parabolic reflector. The three types are optical semaphore, or "bull's-eye," inverted semaphore, and "spreadlite."

When the optical semaphore lens is used with ordinary luminous-arc headlights, the horizontal spread of the beam is 2½ ft. per hundred. It produces a long, narrow beam of light ideally adapted for cars operating at very high speeds on straight rights-of-way, but the wandering of the beam, due to the travel in the arc, is more pronounced than with other types of lenses.

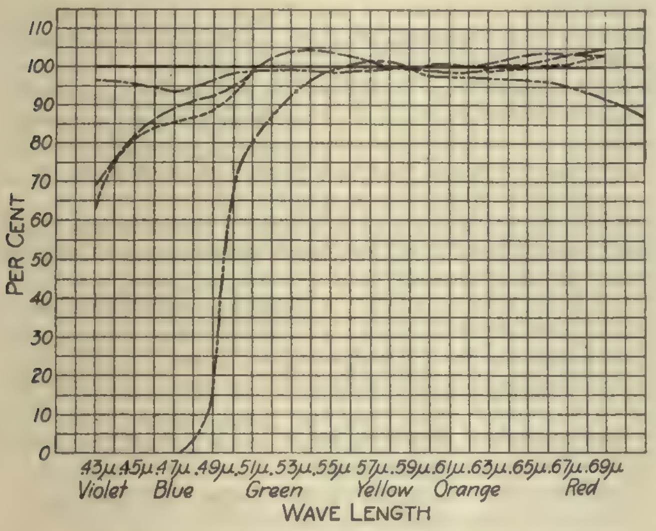

FIG. 10—CURVES SHOWING COLOR VALUES OF SEVERAL HEADLIGHTS

Since the facets of the lenses are on the side nearest the arc, a lens of this type is somewhat more difficult to clean than one of the inverted or the "spreadlite" type.

The inverted semaphore lens is very widely used, since it produces a beam of light slightly wider than the optical semaphore lens. The horizontal spread of the beam is about 6 ft. per hundred, and is adapted to high-speed roads where the right-of-way is somewhat crooked. It affords ample protection to the car and illuminates not only the track, but to a certain extent illuminates the entire right-of-way. Owing to the somewhat greater spread, the inverted lens will not project the light as far down the track as will the optical semaphore lens. Since the facets of the lens are on the outside and a smooth surface is next to the arc, the lens is more easily cleaned.

Where there is a demand for a semaphore lens to throw a very wide beam of light, the "spreadlite" lens is available. The horizontal spread of the beam is made 26 ft. per hundred, but that in the vertical direction is not changed. A lens of this type is particularly adapted to cars that operate at moderate rates of speed on very crooked rights-of-way with numerous intersecting highways. It is also easily cleaned.

FOCUSING

In all headlights it is of the utmost importance that the primary light source shall be located as near the focal point of the reflector as possible. To illustrate this a test was made by L. C. Porter (see *Proceedings* I. E. S., 1915), using a 6-volt, 36-watt, focus-type Mazda lamp in a reflector of 16-in. diameter and 3-in. focus. With the lamp 1/16 in. ahead of the focal point, the intensity of the beam was reduced to 54 per cent of the original intensity, while with the lamp ⅛ in. ahead the intensity was reduced to 34 per cent and at ¼ in. ahead it was only 6 per cent of what it would have been if the filament had been located at the exact focal point. In ordinary railway work it is impracticable to use light sources of the small dimensions of that used in the test, so that the case above cited is somewhat exaggerated, but it serves to bring out the general principle clearly.

Another example will serve to illustrate the effect of filament concentration on the apparent beam candle-power of the headlight. Five incandescent lamps were manufactured, each having the same candle-power, but with the filament wound in different sizes. Using the same reflector with the five lamps in turn the results tabulated below were obtained.

	Relative intensity in center of the beam
240-volt carbon, regular filament	1
240-volt carbon, stereopticon	2
120-volt carbon, stereopticon	5
40-volt Mazda, focus type	12
6-volt Mazda, focus type	60

YELLOW LIGHT

There is much discussion at present as to the value of yellow light. The sum and substance of all of the papers so far presented has been a conglomerate mass of conflicting and personal opinions. At this time there is no absolutely authoritative information on the subject. It must be borne in mind that the subject of yellow light for headlight work is not the same as yellow light for general illumination.

Fig. 10 shows a set of spectrophometric curves made by the Electrical Testing Laboratories, New York, which represents the color value of several headlights. These are all compared with the same 100 per cent standard, a 56-watt focus-type Mazda vacuum lamp. The dot-and-dash curve is for an ordinary crystal glass mirror reflector. The short-dash curve and the long-dash curve are for samples of uranium or canary glass reflectors of different manufacture. These curves are practically coincident. The other curve is an analysis of a piece of "Noglare" glass. Evidently if a real yellow light is wanted this glass will produce it.

I have made many tests of various headlights which produce yellow light, but find no reduction in glare except that directly traceable to the lesser intensity of the headlight, due to the absorption of the glass. So far as my tests are concerned I cannot find that there is any basis for the claim that a light of this characteristic will penetrate fog, dust, smoke or mist to any greater degree than will a white light of equal intensity. There is this about yellow light which appears to be advantageous, and that is, when driving a car through a rainstorm or a heavy fog, the diffractive halation or back glare is somewhat reduced. There are, however, no scientific data on this point.

On this subject the manufacturers of headlights must look to the operating men for definite data. Several manufacturers are putting out headlights with uranium glass reflectors or a combination clear reflector and yellow front glass in response to a demand of the railways. In a matter of this kind any elaborate theory which may be evolved may or may not hold good under actual operating conditions, and the question can only be settled by the co-operation of the railways and headlight manufacturers.

How to Improve Public Relations*

The Matter Is in the Hands of the Company Management and Employees—The Ten Basic Principles Enunciated

BY F. R. COATES
President Toledo Railways & Light Company

SERVING the public is a problem that is always uppermost in the mind of the public utility operator. It is a complex study that requires the deepest thought. The average patron of the street railway system knows the company by the men with whom he comes in contact, namely, the motormen and conductors. They are makers of public sentiment toward the company. If the employees are honest, courteous, neat in appearance and always on the alert to look after the safety of the patrons, it is an axiomatic fact that that company will be in high standing in the its community.

The critic might say: "How about the public policy of the company affecting the employees?" The reply is, those organizations, if there are any, which have an antagonistic policy toward the public, do not have such a class of men as those just described. The reason is that the tendency will be that this ill-feeling will permeate through the different members of any organization with the consequent abuses that will go with it.

Public sentiment should be molded in the board of directors' room of each and every company.

It is immaterial whether one is selling newspapers on the streets or selling street railway transportation, the thought always to be borne in mind is—serve your customers in the best possible manner.

There has been in the recent past a decidedly unfriendly feeling by the public toward public utilities in general. "Isms" of all kinds have been advocated, but these explosions of the dreamers are getting less frequent, sentiment in this direction is returning to normal and in a great many cases to actual boosting for the utility.

There must have been a reasonable cause for this. This condition of the public mind was created originally by the feeling generated by certain kinds of people who can see no good in anything or anybody and are destroyers of things tangible and intangible. The tendency of human nature is to fight back, and in a number of instances in the past, policies have been put into effect by corporations that were to a great extent interpreted by the public as indicating a rupture of the friendly feeling that had previously existed.

Some companies fought this "ismatic" enemy with consideration and forethought. They plodded along, always serving the community to the best of their ability, and others, seeing confidence being restored, adopted the same tactics. To-day we see the pendulum swinging the other way. The corporation is being treated more nearly as it should be and both sides are the gainers.

Suspicion has been the undoing of a great many beings and corporations. The root of all antagonism to the utility is suspicion. Remove this, and we have more idealistic fields of labor. To accomplish the desired result, the public must be taken into our confidence. Keep them advised in advance of all contemplated improvements, methods of operation, etc. If objections are raised, hold conferences with your public and listen to their opinions pro and con, always remembering in your final decision to do the greatest good for the greatest number.

Service is an essential element in making friends. Make certain that your schedules are adequate to care for your patrons. Constancy is a virtue. A well-maintained and regular schedule, one that is dependable, is a pleasing factor to the public.

Clean cars, up-to-date equipment are always appreciated. It may not always be possible to have equipment that is the latest model, but what you have should be neat, kept clean and well painted and always maintained at the highest degree of efficiency.

The employees should be neat in appearance, polite and courteous. A smile at the front end of the car and one at the rear end, as the conductor collects the fares, are well worth while. Pause a moment to think how a "Thank you" is appreciated as one pays his or her fare.

If the employee notices a passenger acting contrary to the rules of the company, have him explain the situation in an agreeable manner instead of gruffly advising the patron of the fact. In order to secure these results, courtesy and politeness must be practised by the officers in dealing with their subordinates. In personal talks, in telephonic communications, in written correspondence, the same politeness should prevail, and it should be of the highest order. Many a friend is lost to the company by an officer or other representative answering curtly and gruffly on a telephone. Always take the time, in a pleasant voice, to explain in detail any misunderstanding.

Volumes could be written on this subject, but it all simmers down to a few basic principles, which are herewith enumerated:

1. A kind word quietly spoken will make friends.
2. Take the public into your confidence and lay all your cards on the table face up.
3. Give service that is everything that the word implies.
4. Treat your employees and the public as you would want to be treated yourself.
5. Remember we are all human and likely to err. Be patient in your dealings with everyone.
6. Keep your property maintained as nearly as possible to 100 per cent standard.
7. Corporation officers should become connected with all bodies in their community that tend toward civic uplift. Be an active member. Do your share of the work. Do not hesitate to let the public know you. Be one of them.
8. The corporation office should be devoid of red tape. The company representative should always keep his door open to the public.
9. Do not keep callers at your office waiting too long before attending to them.
10. Keep your promises. Do not make any that cannot be kept.

Always remember that you will do more toward furthering the public relations of your corporation if at all times you carry out, in its strictest sense, the motto, "He profits most who serves best."

Experiments conducted at the Engineering Experiment Station of the University of Illinois have established a relationship between the ash content of bituminous coal and its specific gravity which makes possible rapid estimation of the ash and moisture content. These tests have also shown that a knowledge of the specific gravity of coal simplifies the problems of estimating tonnages underground and in storage, and of determining the adaptability of coal to treatment by the washing process. The experiments were made by M. L. Nebel and the results are published as Bulletin No. 89 of the Engineering Experiment Station.

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*Abstract of paper read at Toledo meeting of C. E. R. A., Nov. 23-24, 1916.

A Belgian Engineer's Ideas of Heavy Electric Traction in America

Recently Returned from an Inspection of Important Electrifications in the United States, Prof. J. Carlier, of the Faculty of the University of Liége, States That High-Tension Direct Current Is Now Leading and Compares It with Single Phase

JOSEPH CARLIER, assistant professor of railways at the University of Liége, Belgium, recently returned to England from a trip through the United States, where he studied particularly the progress of steam railroad electrification. He has contributed his impressions to *La Lumière Electrique*, Paris, in the form of an article under the caption "Single-Phase Traction and High-Tension Continuous-Current Traction." This contains the results of conferences with a number of railway engineers and observation of several steam railroad electrifications. His comments upon the tendencies in this country are, therefore, based upon first-hand information.

"MONOPHASISTES ET CONTINUISTES"

Referring to the difficulties which American engineers have had to meet in applying electric traction on steam roads, Professor Carlier says that the American engineer knows perfectly well that each time he embarks on a new enterprise uncertainties must be expected, but he is not discouraged by difficulties and solves his problems one by one. As examples the professor cites some of the difficulties which have been met in developing the single-phase system. He refers humorously to the division of opinion among American engineers as to the best system, denominating the extremists on one hand as "monophasistes" and on the other "continuistes." He says that we must admit with the former that excellent progress has been made in reducing the weight of single-phase equipment and in making it flexible. For example, it has been possible to operate three-phase and d.c. motors from a single phase line. This, however, results in greater complication, and the sole advantages which a combined system yields as compared with the high-tension d.c. system are that a line voltage higher than 5000 can be used and dynamic substations are unnecessary. On the other hand in most cases there is no economic advantage in having a very high line voltage and the mercury vapor converter promises simplification of substations to the advantage of the d.c. system.

ELECTRIFICATION SYSTEM ECONOMICS

Taking up the general situation, Professor Carlier says that while the two systems of traction are in use and developing in this country the high-tension d.c. system is making most rapid progress for two reasons. The first is the preference of engineers connected with the companies, and the second is the matter of relative total expense. The last-named item, however, has less weight than in Europe. The American railway man is primarily concerned in developing traffic and he is not so much concerned with the cost of the motive power. In his mind the essentials are to secure simplicity and low capital cost. The consumption of coal or electrical energy in the locomotives is secondary. An example of this is seen in the lack of compound steam locomotives, the powerful ones of the Pacific type of the Pennsylvania Railroad having but two cylinders. While it is true that coal is cheap in the United States, on the other hand labor is expensive, and it is the latter which particularly concerns the engineer. The result of this state of things, which may change later with increase in the price of coal, is that the greater consumption of electric energy in the single-phase system as compared with the d.c. system does not interest the American engineer to the same extent as it does those in European countries. On the other hand he appreciates the greater simplicity of the equipment as a whole and the non-existence of dynamic substations which require constant attendance. His attitude toward the single-phase system for long-distance lines is sympathetic because its principal advantages lie in the net cost factors which interest him most.

Summarizing the qualities of single phase as compared with direct current, Professor Carlier gives the following: the energy consumption is greater; there is less labor required (in substations); it is simpler, and the required investment is less. But when the traffic is considerable the extra expense of electrical energy exceeds the reduction in capital and labor cost, to the extent that the advantage rests with the direct current. Since high-tension direct current (3000 to 5000 volts) has become practicable the single phase has less interest. It is significant that the Westinghouse Company, which has virtually monopolized the single phase, has for more than a year been experimenting with 5000 volts direct current, from substations equipped with mercury vapor rectifiers.

SINGLE PHASE STILL ACTIVE

The two systems operate very well in the United States and in spite of special difficulties which the New Haven Railroad, the first important single-phase electrification, encountered in the early years, there appear now to be no special operating difficulties. The Philadelphia-Paoli line has shown very regular operation. That the single phase still enjoys great favor is evident from the fact that the Pennsylvania Railroad is planning to electrify a section of its main line between Altoona and Pittsburgh at 11,000 volts single phase, with an overhead contact line similar to that between Paoli and Philadelphia. This part of the line is quite broken and it carries an important freight and passenger traffic. Increase in capacity of the line rather than economy in cost is sought in this case. This railroad is also considering the electrification of the New York-Philadelphia line at 11,000 volts. The New York terminal of this has been electrified since 1900 at 600 volts direct current, with third-rail, and has operated admirably.

ADAPTABILITY OF ELECTRIFICATION

Professor Carlier considers that the Pennsylvania Railroad, which is considered as in the forefront of progress, has taken up the electrification problem resolutely. He quotes J. T. Wallis, general superintendent of motive power, to the effect that while electric traction on heavy lines is still in the experimental stage, the systems available are in such a state that there is no risk in adopting them for a period of twenty years at least. The Pennsylvania does not consider its selections final, but expects to apply the latest developments in electric traction. Professor Carlier points out further that progress is to be expected, but it would be ridiculous to delay electrification until the realization of this progress, for the same situation exists and has existed with respect to the steam locomotive.

The selection of contact system, overhead line or third-rail, and form of current (he evidently eliminates consideration of three phase) is a perfectly simple problem and there are numerous solutions. It is possible to pass from one form of current to another and from one kind of contact system to another, as in the case of the New Haven operation into the New York Central terminal in New York. In the future it will be necessary to remodel an existing steam road electrification from time to time, introducing new types of rolling stock and contact system and changing the form of current. Electrical equipment is well adapted to this process.

MERITS OF HIGH-TENSION DIRECT CURRENT

Summing up the situation the professor admits that the reliability of the systems of electric traction in present use is such that the future holds great possibilities. In the light of the experience with the traction systems in use in the United States and in Europe, for railroad lines now operated by steam and approaching the limits of capacity and which are not of considerable length, the direct-current system at high tension (3000 volts or even 5000 volts) with aerial equipment is most economical. The General Electric Company has equipped in the United States a number of lines with direct current at high tension, including an important road which has been operating regularly at 3000 volts for many months.

While it is true that the high voltage has its place, it is also true that the more intense the traffic the lower can the voltage be. Thus for underground roads in cities, with close headways, the use of third-rail with the moderate voltage of 600 is quite economical. But to the extent that the distance increases and at the same time the traffic diminishes, the contact line voltage must be raised. If the traffic becomes comparatively light, the advantage of very high tension, and therefore of single phase, appears.

Between the two limits of contact line voltage, 600 and 11,000, there is an economically mean tension corresponding to a traffic sufficiently intense on relatively short lines, namely, 3000 volts to 5000 volts, permitting the use of direct current with all of its inherent advantages.

THIRD RAIL AND AERIAL LINE

Third rail electrification of the New York Central Railroad (32.3 miles) and of the Pennsylvania Railroad at New York (9 miles), as well as of the subways, the Hudson & Manhattan Railroad and the elevated railroads in New York has been successful for many years. We must look also to the electrification over long distances with third-rail at higher tension, 2400 volts. Up to the present this line of development has not progressed very far, but such progress is desirable, and great improvement must be made in the future in this direction.

Unfortunately the economical voltage is not always compatible with the use of third-rail. Under these conditions, in spite of the sentiment of the railroad engineer for a system in which there is no clumsy and complicated superstructure, he must accept the aerial equipment. In time the third-rail with 2400 volts and even 3000 volts will become practical, but to use third-rail at this tension economically, a certain density of traffic will be necessary. It should be added also that in certain installations, such, for example, as that of the Philadelphia-Paoli line, the overhead construction has been made more sightly than that of previous installations through the use of cross supports and posts which are comparatively light while still sufficiently strong. The railroad engineer is thus partially satisfied.

It should be emphasized, however, that both high-tension direct current and 11,000 volts single phase are entirely practical and operate with entire reliability. While the former seems to be in more favor, the single-phase system is still developing, although, as explained, the trend of progress tends to render competition with the direct current more difficult.

MECHANICAL FEATURES OF ROLLING STOCK

In the United States the locomotives most favored are those with jackshafts geared to the motors or connected with them by rods and cranks. The Pennsylvania Railroad has combined these drives in a locomotive for heavy freight train service from Altoona toward East Pittsburgh. This locomotive consists of two similar units each with three driving axles connected to a jackshaft, which in turn is driven by two motors through connecting rods. Between the electric motors and the jackshaft is an elastic coupling containing powerful springs which absorb in part the variations in the driving force.

The locomotives used at the Pennsylvania Railroad terminal in New York, from Manhattan Transfer to New York, contain jackshafts driven by the motors through connecting rods and cranks. They are very stable at high speeds, and Professor Carlier was able to state from personal recent observation that the stability and other operating characteristics were absolutely perfect at a mean speed, including starting and stopping, of 45 m.p.h. and a maximum speed of nearly 70 m.p.h. The railroad management is justly proud of these locomotives, which, it appears, are also able to operate on long runs satisfactorily. However, there is as yet little experience along the latter line and further information as to the durability of electric locomotives on long runs at high speed is desirable.

The New York Central locomotive with motors mounted directly on the axles, and the New Haven locomotive with motors driving the wheels through elastic couplings are giving regular service with important trains. It seems, however, that the New York Central plan with armatures mounted directly on the axles requires a track perfectly constructed and maintained, a condition which appears to exist on the electrified section between New York and Harmon. Nevertheless this installation furnishes valuable data for reference, and it must be admitted from an inspection of the motors after long use that they have surprising mechanical as well as electrical qualities. This example, however, has not been followed by other companies. In this arrangement the center of gravity of the locomotive is low with a corresponding tendency to strain the track, and the gyroscopic effort developed on sharp curves at high speed is apt to produce a reaction inimical to the stability of the railway.

In the United States the tendency on the whole is to use multiple-unit cars when possible, wherein the motor equipments are arranged under the cars to provide the maximum passenger space. Locomotives are only employed for through trains and freight trains. There is as yet little experience with these cars at high speeds, say 75 m.p.h., or more on long runs. The use of steel passenger cars is extending very rapidly. In the case of motor cars this has been brought about to secure absolute insurance against fire.

SUMMARY AND CONCLUSIONS

In Professor Carlier's opinion we shall see in the United States before many years the electrification of a truly high-speed line with heavy traffic on which the electric locomotive and also possibly the multiple-unit car will be subjected to speeds of 75 m.p.h. or more for an hour or two. The Pennsylvania Railroad, always in the forefront of progress, seems to desire to undertake an electrification of this kind on the New York-Philadelphia Line.

Summing up in résumé the results of his observations in the United States, Professor Carlier says that this country affords abundant and instructive examples of the electrification of railroad lines in which complete success has been achieved. It is important for European countries to investigate these, although to copy directly the practice in this country is not advisable. It is necessary intelligently to adapt American systems and methods to European conditions. The choice of system with all of its possible variety must depend upon the numerous and complicated characteristics of the railroad to be electrified.

The Future of the Street Railway

New England Street Railway Club Hears Address on Regulation, Valuation, Fares, Public Relations and Other Future Factors

AT a meeting of the New England Street Railway Club in Boston, Mass., on Nov. 23, with President C. V. Wood in the chair, Edwin F. Jones, counsel Manchester Traction, Light & Power Company and allied electric railways recently concerned in fare increase proceedings before the New Hampshire Public Service Commission, delivered an address on "The Future of the Street Railway," which was received with unusual enthusiasm. After a comprehensive survey of street railway development, the penalties of early overconstruction and financial mistakes, the influence of electrification upon traction expansion and the increasing demands of the public, Mr. Jones took up the points of regulation, valuation, fare units, tax abatements and jitney competition.

THE FUTURE OF REGULATION

Regulation, in Mr. Jones' opinion, is probably more essential to the future welfare of public utilities than to the public itself, for it includes governmental protection to the properties and to the securities issued under public authority. Provided good judgment has been used in selecting the locality in which to operate and the community has need of the company's service, the security holder of the future under regulation may rely upon the fact that in the end such charge for the service rendered as will make his investment reasonably profitable will be sanctioned by the authorities. A commission cannot under the law authorize a stock issue by a street railway for money actually invested in the plant and then afterward refuse the company the right to charge such a fare as will assure a reasonable dividend upon that stock. The necessary increases in fare may come step by step, one at a time, but in the end the desired result is bound to be attained. Utilities, Mr. Jones said, must realize that the public service commissioners generally represent the average public opinion, and that they desire to be fair to the companies as well as the public. If they make mistakes in the law, the courts will afford a remedy.

Mr. Jones stated that the determination of the value of the property devoted to the service of the public is the first and fundamental requirement for future business. Every street railway ought immediately to welcome and prepare for the official determination of the value of its property devoted to the use of the public. Fares cannot be raised on any road until the supervising commission is satisfied that the increase is necessary to afford a reasonable return upon the value of the property after the payment of all allowed charges against revenues. A certain value is better for the security holder than a higher estimated one. When once fixed by a commission, the valuation is not likely to be reduced, as under official regulation provision for renewals will be required and all future additions will perforce be accurately recorded. In future rate hearings or in refinancing, therefore, the difficulties of the present situation will be avoided. To Mr. Jones' view it would be better for the business to start over with a clean balance sheet approved by the public authorities to be used as a basis for all future operations. It would be better to have securities scaled and be able to charge rates which would give at least a 6 per cent dividend, whose permanence might be relied upon, than to go on with existing uncertainties as to value and income. A small certainty is a better basis for business than a doubtful proposition of estimated but undetermined larger value.

SEVEN AND EIGHT-CENT FARES ARE PRACTICABLE

The public, Mr. Jones averred, ought constantly to be reminded of the advantages that American street railways afford as compared with those in foreign countries. The length of ride for a single fare, the system of free transfers, the speed of the cars and the higher wages paid should all be kept constantly in the public mind by judicious advertising or otherwise. More important than almost anything else, the public must be taught that there is nothing sacred about a 5-cent fare. A 6-cent fare is just as pure, just as holy, if the investment needs of the railway warrant the increase. Since the recent increases from 5 cents to 7 cents and 8 cents were granted on lines outlying the Manchester and Nashua districts, the public has seemed to ride as freely as before and no great complaint has been registered. With the great rises in wages and in operating and construction costs generally, street railways are justified in raising the selling price of their product. Every increase thus authorized will help in every other application for the approval of fare increases. The public, Mr. Jones believes, will be reasonable when all the facts are before it.

BETTER PUBLIC RELATIONS SUPREMELY IMPORTANT

Continuing, Mr. Jones stated that every effort ought to be made by street railway managers to mold public opinion so that some of the undue burdens and restrictions now imposed by law may be eliminated. There is no fairness, for example, in requiring an electric railway to maintain street paving between its tracks and for a distance of 18 in. on either side. The reason for the requirement vanished with horse cars. Besides, a street railway pays its proper proportion of the cost of building and maintaining highways when it pays its taxes.

Moreover, the unjust and damaging competition of jitneys must be curtailed if street railways are to have a cheerful future. Here again only a change of public opinion can bring due relief. The public must be made to realize that within the last twenty-five years street railways have been one of the greatest factors in the growth and improvement of American cities, and that future growth is in large measure dependent upon street railway extensions. Jitneys should be made common carriers and subjected to the same public regulation as other agencies of local or inter-community transportation. Bonding against accidents is equally essential. Unless properly regulated, jitneys are a very serious menace to the street railways, and public opinion should be turned toward the inevitable results which will follow to both the railway and the community welfare if regulation is not imposed.

Regardless of protective laws, however, the greatest and most important thing for the present and for the future, in Mr. Jones' estimation, is to increase the number of passengers carried on street railways. If this cannot be done by bringing the service to the highest state of efficiency and keeping it there, it cannot be done at all. Each successful company must have a pleased clientele, a satisfied lot of regular patrons who will recognize the needs of the railway and the advantages which the railway affords to the community.

The co-operation of organized employees in securing jitney legislation may be a great help in meeting that particular problem. Employees must be so treated that they will be satisfied and loyal and that by their conduct and manners they will attract and not repel the public. Wages and general conditions must be such as to attract and retain a superior class of employees. The necessary increase in operating cost due to such conditions will be recognized when fares are regulated.

Fair treatment of claimants, also—prompt adjustment of cases where the liability of the railway is clear and generous compromise where it is doubtful—will bring better results than the policy of the old-fashioned claim agent who always denied liability and took every advantage in making settlements. Companies should always be ready to fight to the finish, however, claims which are known to be unfair or faked. Nearly everyone in a town knows about the verdicts which juries award against street railways, for the newspapers publish them prominently. Such involuntary advertising ought to be reduced to a minimum and few cases should actually be sent to a jury unless a defendant's verdict may confidently be expected. The less notoriety there is about the handling of the claims department the better.

Safety Cars and Accident Claims Occupy Attention of I. E. R. A.

Higher Wages and Better Service Result from a Complete One-Man Car Installation on One Fort Worth Line—Waterloo Installation Also Successful—Harmony and Co-operation Keynote of Addresses on Claims

ONE of the principal features of the Nov. 28 meeting of the Illinois Electric Railway Association, held at the Hotel Sherman, Chicago, was the address by Samuel Insull on the subject of "Economies in Power Supply" which was made at the noon luncheon. This appears on another page in this issue. Aside from this address, the association devoted the one-day meeting to the subject of the operation of one-man cars at the forenoon session and to a discussion of personal injury and damage claims at the afternoon session. Two valuable papers, by Carl Beck, Westinghouse Traction Brake Company, St. Louis, Mo., and C. D. Cass, general manager Waterloo, Cedar Falls & Northern Railway, Waterloo, Iowa, respectively, were read on the first subject and the latter was presented by address. Abstracts of these papers will appear in a later issue. The meeting was presided over by President J. R. Blackhall, general manager of the Chicago & Joliet Electric Railway, and there were about 100 in attendance at the luncheon to hear Mr. Insull, and about fifty at the other sessions.

At the end of his paper, Mr. Beck gave some figures to show the results of operating one-man cars on one line in Fort Worth. During the first twenty days in November, 1916, the total number of passengers hauled was 90,600; while for the first twenty days in October, 1916, with two-man cars the number was 78,000, and for the first twenty days in November, 1915, 75,000. In the first comparison the increase was 13.2 per cent and in the latter 20.6 per cent. The car-miles operated with the one-man cars was an increase of 54.3 per cent over that with the two-man cars. The receipts per car-mile showed a decrease of 23.4 per cent but the cash received, exclusive of tickets, showed an increase of 22.2 per cent for the twenty days in November over the similar period in October, and 22.3 per cent over the first twenty days of November last year. The figures covered a period long enough to show that the increased riding was not due to curiosity seekers, but rather to the fact that automobile owners were induced by the frequent service to use the street cars instead of their own automobiles or the jitneys to go down town.

The papers by Messrs. Cass and Beck were both read and then discussed jointly. President Blackhall was interested to know if much trouble had been experienced in placing the one-man cars in operation and whether or not the car men were organized in Waterloo. The question was also asked as to whether or not more money was paid to the men.

Mr. Cass answered that the men on his property were not organized and that some trouble was experienced in placing the cars in operation, due principally to the fact that a municipal election was in progress at the time and the new cars gave the politicians a good talking point. The company had considered paying the men more money, but finally had decided not to do so, and as a larger number of cars were placed in operation, none of the men were displaced. He said the men preferred the two-man car because it was natural for men to get out of as much work as possible. Mr. Cass also pointed out that at the present time the American Federation of Labor is actively at work in Iowa in an attempt to get a State law against the use of one-man cars and that this may be one of the serious problems in connection with their use.

F. E. Fisher, general superintendent Chicago, Ottawa & Peoria Railway, noted that the two papers differed as regards the schedule speed, this having been improved in Fort Worth and made slower in Waterloo. This was explained by Mr. Cass as being due to the fact that the

Fort Worth cars were of the very latest type, while those in Waterloo were equipped with manually operated brakes and doors. This had made it necessary to add a few minutes to the schedule to give the men time to make out their reports.

Mr. Beck said that the higher schedule speed with the one-man cars in Fort Worth was partly due to the high rate of acceleration and braking of the new cars, but that the principal advantage had been realized through the more frequent service which had made necessary the handling of fewer people at each stop.

The matter of wages, he said, had not been settled in Fort Worth and thought that some companies might feel that the Fort Worth company had too broad a view on the subject. Upon putting the one-man cars in operation they had increased the wages 2 cents an hour, but now felt, after having seen the possibilities for operating economies, through the use of these cars, that they could afford to go still further. They analyzed the question by noting that the seniority men were always anxious for the longer runs, because of the greater compensation from them and had concluded to put the men on a ten-hour-a-day basis as beginners, and arrange enough increase in wages to give the men the same wages they now receive for twelve to fourteen hours' work. Future laws may force them to go to eight hours a day labor schedule, but they feel that the economy of the one-man car will still take care of this. They are willing to divide the increased net returns in three ways; giving the men their share, thus making them glad to operate the one-man cars, and giving the people better service and the company better returns.

In regard to the acceptance of the one-man cars by the public, Mr. Beck said that after they had been operated on the one line for a few days, rumors were circulated that the company was planning to extend the system to other lines and the officials began to get suggestions from individuals to put these cars on their particular lines. Later these suggestions became direct requests and came in by letter and personal visits to such an extent that the officials made the remark tnat they wished they had fifty cars to put in operation. Mr. Beck said that the officials of the Houston (Tex.) property had made a visit to see the Fort Worth cars in operation, and although they had previously been skeptical, after seeing them in operation and how the people accepted them, that they were now planning to place an order for fifteen.

Mr. Fisher also called attention to the disagreement of the two papers, one advocating small platforms and the other large. Mr. Cass answered that in his own case, the narrow platform had been the cause of greatest complaint on the part of the public, but said that they were really trying to find something to complain about, as this was just at the time of a municipal election. They made no objection to the two-man cars with similar platforms which necessitated that passengers wait for others to get off before they could get on. It had also been his observation in other places, where the one-man cars are used, that the large platform facilitating loading and unloading simultaneously had been one of the features which had appealed to the public and about which they had expressed commendation.

Mr. Beck defended the narrow platform on the ground that few passengers get on at each stop owing to the frequent headway. He said he had been impressed by the tendency of the narrow passage to cause the passengers to line up and enter the car in an orderly manner and with less confusion than results with the large platform where all get on at once and cause a momentary congestion while paying fares and making change. He said with a single line of passenger movement he had noticed many times that the passenger who presented a bill or did not have exact change, would be pushed one side while the others paid the exact fare and passed on into the car; and that this had the advantage of discouraging the practice of not having the exact fare ready. On the Fort Worth cars the door opening is 30 in. with no separation or stanchion rails. He said it had been remarkable how the people had showed to a great degree a desire to promote the rapid transit which the company had inaugurated. He said he had seen a car loaded up with thirty-five passengers, every one of whom had presented the exact fare. They had also shown a tendency to be ready to get off as soon as the car came to a stop.

ADDRESS BY GEORGE WHITMORE

At the afternoon session George Whitmore, claims attorney Illinois Traction System, addressed the association on the organization and operation of the claim department of his company. The keynote of this talk was to point out the great value of harmony and co-operation between the claims department and the operating officials. The claim department of the Illinois Traction System is a separate organization known as the Western Illinois Accident Association, which is operated in the nature of a mutual benefit association for all the companies of the Illinois Traction System. The system of financing, which is claimed to be satisfactory and economical, is very unique and provides that each company contribute a certain per cent of its gross income to the association. This percentage varies according to the nature of business and hazards under which the various companies operate. The work of the association is directed by an executive committee and administered by a board of trustees. Payments for claims are made by draft or voucher and each claim agent carries a draft book with him for prompt settlement wherever possible. The operating officials of the company have no direct authority over the activities of the claim department, but their recommendations receive careful consideration. In this connection, Mr. Whitmore said that there was no conflict of interest, and that closest co-operation and harmony existed between the operating and claims officials.

The local general superintendents are made personally responsible for the handling of accidents and settling of claims. They generally have some man who makes out the reports and secures the details through investigation. These superintendents are authorized to pay small claims out of their operating funds and then request payment from the Western Illinois Accident Association. If large amounts are involved, they are taken out of the association direct and the case handled very largely by the general attorneys. As a result of this close working between the superintendents and the claims department, a general feeling of confidence and co-operation is fostered and a most harmonious co-working of the two departments follows.

The Western Illinois Accident Association is headed by the general claim agent who has under him four district claim agents located at Peoria, Decatur, Springfield and St. Louis. These district agents are responsible for the handling of all claims in their respective districts and keep in close touch with the operating department. For all except very important cases, they use their own best judgment in making settlement and the draft and release are forwarded to the general claim agent's office, who maintains a complete file on every accident. By this means the latter can check over the judgment of the various district agents and also guard against fraud by having the broader information available.

It is the policy of the department to dispose of all accidents in which the company is responsible as soon as possible, for it has been its experienec that the longer a case drags out the more expensive it becomes. They aim to be absolutely fair and just and to impress on the people the fact that the company wants to be fair and just as liberal as possible.

Mr. Whitmore described the method of handling an accident. The motorman or conductor or other employee telephones the dispatcher all the details. The dispatcher telephones these to the superintendent of transportation and he telephones them on to the claim department. The train dispatcher also gives the details to the district claim agent and he makes out the written form for the general office. Finally the personal statement of the crew is taken, but in serious accidents the claim department makes this record in order to bring out all possible details.

The operating department holds schools of instruction for the trainmen at which various phases of the company's business are discussed, and every endeavor made to promote careful operation, and it is believed that great good is accomplished from this source.

ADDRESS BY CHARLES H. PEGLER

Charles H. Pegler, general attorney Aurora, Elgin & Chicago Railroad, following Mr. Whitmore, addressed the association along much the same lines, bringing out some of the details of how claim work is handled on the Aurora, Elgin & Chicago. The company is striving through safety-first work to avoid accidents as far as possible by working with both the employees and the public. One feature of the settlement of claims which Mr. Pegler had found valuable was the manner of calling train crews in after claims had been paid and letting them know just how much they cost the company. Some of these accidents which appeared very trivial to the men, in many instances surprised them greatly by the large amount required to settle, and impressed upon them the great importance of avoiding even minor accidents. They are made to feel how serious these matters are and even if they are not at fault, the case may at least serve as an important lesson.

The principal problem of the claim department is how to gain the co-operation of the public. As business grows, the dangers are increasing constantly due to the good roads which make vehicle travel faster and more dense. More than one-half of all accidents are due to collisions with vehicles and to boarding and alighting. To avoid either class requires the co-operation of the public. To this end, the company is making addresses to automobile clubs, to the school children, to the civic clubs, etc., but is somewhat limited in the extent to which it can carry on this work by the cost of flooding the country with signs and newspaper advertisements, etc., which would be very valuable.

In payment of claims, Mr. Pegler said that he always took particular pains to see to it that persons to whom claims were paid were thoroughly satisfied, as he is very anxious that they do not go away and "knock" the road and tell how the company robbed them, etc. He always informs them that unless they are perfectly satisfied with the amount, that he would much prefer to litigate the whole matter rather than to pay them any amount and have them go away dissatisfied. He always maintains a frank and truthful attitude toward these people, as the company has nothing to conceal from the public, and finds it is always best to be open and above board.

President Blackhall read a communication to the members relative to the advocation of a law requiring automobiles to come to a full stop at railroad crossings, applying more especially to unprotected country crossings. It was voted to refer this to the executive committee with instructions to mail copies of the communication to all the member companies.

President Blackhall said that in answer to the A. E. R. A. circular letter sent out regarding crossing protection and asking for suggestions, that he had suggested that a series of bumps or waves in the road surface should be placed on either side of railway crossings for about 250 ft. or more, beginning with small bumps and increasing in size near the track. He said that while this seemed like a joke in one way, that he believed it would be effective in bringing about the desired results.

H. B. Adams, safety supervisor of the Aurora, Elgin & Chicago, suggested that it would be a good thing to put a card in every garage with the following two safety admonitions: "Equip Your Automobile with Brains," and "The Best Safety Device for an Automobile is Common Sense."

Samuel Insull on Interconnecting Power Supply Systems

In I.E.R.A. Address He Recommends That Interested Associations Gather Data to Show Possible Operating Economies to Be Secured Through Co-operation

SPEAKING before the Illinois Electric Railways Asciation at Chicago on Nov. 28, Samuel Insull, president Commonwealth Edison Company, Chicago, said electrical people had spent energy, time and money in perfecting economical apparatus, but had neglected to some extent to study the conditions of supply through which great economies could be effected. At one time, said Mr. Insull, less energy per capita was sold in Chicago than in any other large community. But since a study has been made of methods for taking advantage of the different demands and the diversity factors of all classes of business, and since steps have been taken for the massing of production, the Commonwealth Edison Company now supplies more energy per capita than any other company in the world operating on steam power. But even with this record the company supplies only about one-third of the possible energy consumption in Chicago. Down-State companies, according to the best information available, are supplying only about one-fifth or one-fourth of the possible energy production.

The most neglected point in economic power supply is the study of conditions governing the use of electricity. Too few are taking advantage of everything to prevent duplication of investment. Too little attention has been given by most people to the seasonal diversity that exists, and there has been not enough marshalling into one vast system of distribution with the idea of preventing duplicate investment to reduce the average over-all cost per kilowatt-hour of supply.

As an example of this, two great companies, recently at swords' points, were much surprised to learn that both could make a great saving by combining their loads. They were doing approximately a $15,000,000 business, one being largely occupied with urban and the other with interurban transportation and power supply. It was learned that the peak load for one came in the forenoon while the peak of the other occurred in the afternoon. There was a duplication of equipment to the extent of 8000 to 10,000 kw. capacity, and each was striving to get business to enable it to pay interest on this investment, when, by combining the loads, the investment which served one in the forenoon could easily serve the other in the afternoon.

In seeking to obtain data on such conditions the use of instruments of precision is very necessary. A few years ago these were not available and men in the industry had only a hazy idea of the maximum requirements of any business and the time in which the maximum occurred. Instruments now record not only the maximum requirements, but the exact time at which the maximum occurs.

As an instance of what may be learned through studying diversity, Mr. Insull told of a community around Wilson Avenue, Chicago, in which the inhabitants were all in about the same class, with approximately the same habits, and same buying power. In one block, with 200 possible customers, the separate demand of each showed an average load factor of about 5 per cent. As a group, however, the load factor, as the result of diversity, was about 20 per cent. Adding the other blocks in the neighborhood containing stores, picture shows, etc., the result showed a neighborhood load factor of about 30 per cent. Going still further into the situation it was shown that the maximum demand of the neighborhood as a whole occurred at about 8 o'clock in the evening, while the company's peak occurred at about 4.35 p. m.

Considering supplying energy on the basis of the individual 5 per cent load factor, the condition would spell bankruptcy for a company. The business at a 20 per cent load factor would put the company in the class struggling for existence, just as most companies were doing twenty-five years ago. With this business at a 30 per cent load factor the return is such as was considered ample before the wholesaling of energy became the order of the day. Under present conditions, however, this class of business grouped with industrial power, heating, railway and various industrial demands in Chicago produces a load factor of between 40 and 50 per cent. Some may think, Mr. Insull said, that these conditions apply only in Chicago, but in reality they apply just as truly to the densely settled agricultural and manufacturing territory throughout the State of Illinois, and he was confident that studies of these methods applied by one or a dozen organizations in the production and distribution of energy throughout this State, or any State east of the Mississippi River, would greatly reduce the average energy cost.

Engineers of the Insull companies are now engaged in working out a map of the transmission lines of the State of Illinois and securing as far as possible the maximum demands of the different systems and the times at which these maximums occur in order to determine the diversity between the various systems. It is not the idea that energy produced in the Illinois coal fields can be used on the northern border of the State. But if all electrical properties of the State were feeding into one vast network of transmission lines, the electricity supply companies would have contributed more to the conservation of the resources of the State than even the high-sounding promises of politicians in this direction. There would be an enormous saving in investment and in operating expenses; and if the interconnections were extended to include steam railroad supply, it would be possible to effect an economy in energy distribution that cannot be hoped for through increasing the efficiency of generating and distributing apparatus. Just now the world is being taught great lessons in marshalling the forces of men, and the producers and distributers of electrical energy should see to it that they get the greatest possible return from every dollar of investment.

Mr. Insull said he was very much interested in the production of power at Keokuk, Iowa, and in discussing the project with Messrs. Stone and Webster had ventured the statement that energy-producing enterprises of Iowa and Illinois, owing to lack of co-operation, are throwing away more energy annually than can be produced at Keokuk. He also expressed himself as anxious to secure the co-operation of the Illinois Electric Railways Association and other similar bodies in getting records for the benefit of all to show what it is possible to do by interconnecting systems.

Taking such steps means greater economy of capital, lower cost, and lower selling price. The regulatory bodies at present are most interested in low selling price. Mr. Insull said he, too, was interested in a low selling price, but believed that the time would come when regulatory commissions would be interested in a company's method of distribution as much as in its methods of financing.

In closing, Mr. Insull called attention to the possibilities, through interconnected systems, for the small-town manufacturer to purchase power at prices as good as he would be able to obtain in the large cities. This would tend to develop the small community far more rapidly than is now possible and would also arrest the concentration of population and industry in the great centers. The men of the electrical industry, co-operating to conserve the resources of the State, will be able to feel that they are doing a large share in uplifting their fellowmen and contributing to the security and prosperity of the State.

COMMUNICATION

More About the Automatic Stop

VIRGINIA RAILWAY & POWER COMPANY
RICHMOND, VA., Nov. 28, 1916.

To the Editors:

In the issue of the ELECTRIC RAILWAY JOURNAL for Nov. 25, page 1121, you published an article describing the automatic car stop which we have been using for the past two years on the lines of the Virginia Railway & Power Company. I think that your readers would be interested in another fact regarding this system which probably occurred to them in reading the article, namely, that the automatic stop can also be operated very nicely in conjunction with a block signal system, in which case the switches which are used to de-energize the overhead channels would be operated by the signal semaphores.

I have also just been granted a patent covering the application of the general plan described in your article to single-truck cars or to double-truck cars not equipped with air brakes. In such cases a small reverser takes the place of the electropneumatic valve. The reverser is in circuit with the contacts on the top of the car and, when these engage the energized stationary contact, the motor connections are reversed and the motors tend to operate as short-circuited generators, bringing the car to rest. While this device has not been developed as fully as the others it has been tried out on our lines and has proved absolutely practical.

A. TAURMAN,
Superintendent of Rolling Stock.

Statistics compiled by one of the large Eastern Railway companies recently developed the fact that in the renewal of 369 miles of trolley wire of all gages from No. 0 to No. 0000, but mostly 00, the average return for the old copper was 74 per cent of the original weight of the wire.

ASSOCIATION NEWS

President Boylan of the Accountants' Association Announces Committee Appointments—At the Connecticut Company Section Meeting on Nov. 14 Addresses on Timely Topics Were Made by Speakers Prominent in the Industry—Reports of Chicago and Washington Section Meetings

Accountants' Association Committee Appointments

President M. R. Boylan of the Accountants' Association has made the following appointments to date. There still remain to be completed the following: The committee to represent the Accountants' Association at the 1917 convention of the National Association of Railway Commissioners, the committee on education, the committee on passenger, express and freight accounting, and the joint committee on life of railway physical property.

Accounting Definitions—John J. Landers, York, Pa., chairman; George A. Harris, Gloversville, N. Y.; S. C. Stivers, New York, N. Y.; J. Gerry Dobbins, New York, N. Y.

Standard Classification of Accounts (standing committee)—H. L. Wilson, Boston, Mass., chairman; W. F. Ham, Washington, D. C.; W. H. Forse, Jr., Anderson, Ind.; R. N. Wallis, Fitchburg, Mass.; P. S. Young, Newark, N. J.

JOINT COMMITTEES

Claims-Accounting-Accountants' Association—H. J. Davies, Cleveland, Ohio, chairman; George B. Cade, Asbury Park, N. J.; H. S. Swift, Pittsburgh, Pa. (Claims' Association members not yet announced.)

Engineering-Accounting-Accountants' Association—F. H. Sillick, New York, N. Y., vice-chairman; B. E. Bramble, Champaign, Ill.; Charles H. Lahr, Akron, Ohio; J. C. Collins, Rochester, N. Y.; H. A. Gidney, Boston, Mass. (Engineering Association members not yet announced.)

Transportation-Accounting-Accountants' Association—A. D. Dedrick, Youngstown, Ohio, chairman; George E. Kalweit, Milwaukee, Wis.; W. O. Ingle, Rochester, N. Y. (For T. & T. Association members see ELECTRIC RAILWAY JOURNAL, issue of Nov. 25, page 1115.)

Annual Meeting of Connecticut Company Section

On Nov. 14 Section No. 7 held its annual meeting in New Haven with an attendance of 147 members and guests. The meeting was preceded by the usual dinner, both being held at the Hotel Garde. The company section orchestra played during the evening and other entertainment features were provided. The serious part of the program included the presidential address of W. J. Flickinger; an address on "County Bureaus to Encourage Agricultural Development as They Relate to the Street Railway Industry," by R. W. Perkins, president Shore Line Electric Railway; an illustrated talk on "Railway Traffic Problems," by Edward Dana, superintendent of traffic Boston Elevated Railway; a talk on "The Cost of Maintenance and Operation of Electric Railway Properties To-day Compared with a Year Ago," by L. S. Storrs, president The Connecticut Company; and remarks by C. V. Woods, president Springfield Street Railway, in the course of which he said that he hoped to install a company section on the Springfield properties some time in the future.

The result of the election of officers was as follows: W. J. Flickinger, chairman efficiency committee, president; I. A. May, comptroller; W. E. Jones, statistician, and G. H. Cresson, chief clerk treasurer's office, all reelected, and H. L. Wales, superintendent, Waterbury, director for three years.

President Flickinger reviewed briefly the short history of the section, which was organized on Dec. 7, 1915, stating that the present membership is 240, that there have been nine meetings with an average attendance of 75 per cent of the membership, that nine papers have been presented by members and eight talks on live subjects given by men of high standing in their professions. He expressed satisfaction that the American Association committee on award of the medal for the best paper read before a company section had made honorable mention of papers prepared by H. Bates and H. N. Balfour, and said that the section hoped to give this committee a great deal more work next year in its effort to select the medal winner.

Chicago Section Hears Travelog by Claim Adjuster Scholz

The regular meeting of the Chicago Elevated Railway Company Section was held on Nov. 21 with about 100 members and visitors present. President E. J. Blair announced the appointments to the program and membership committees. An important amendment to the constitution was passed providing for the membership of the outgoing president in the executive council, to provide continuity of administration.

The speaker of the evening was A. F. Scholz, chief claim adjuster, who described a trip around the world, and illustrated his lecture by more than 200 slides from pictures mostly taken by himself.

Clarence P. King Addresses Section No. 4

At a meeting of the Washington Railway & Electric Company Section, held in Washington on Nov 25, the Electrical Week Appliance Show which begins to-day was the feature of interest. The section is to be represented in the automobile parade next Tuesday evening by a decorated car driven by William L. Clark, vice-president of the section.

The feature of the meeting was an informal address by President Clarence P. King of the Washington Railway & Electric Company, who showed how electricity is the twin brother of prosperity. Addressing the railway men he said, "Whether you occupy the position of conductor, motorman or director of the company you will play your part in the city's prosperity through your 'electrical connection,' so to speak." President J. T. Moffett of the section announced that at the regular meeting to be held on Dec. 11, Warden J. H. McKenty of the Eastern Penitentiary, Pennsylvania, would speak on "Recent Activities in Prison Reform."

In the abstract of the address delivered on Nov. 16 by ex-Senator Edmund W. Wakelee before the Public Service Railway company section, which was published in the issue of the ELECTRIC RAILWAY JOURNAL for Nov. 25, page 1095, Mr. Wakelee's name was incorrectly printed. It should have appeared as in this note.

Some Recent Advances in
EQUIPMENT AND ITS MAINTENANCE

Superintendent Montreal Tramways Traces History of Prepayment Cars in That City—Way Engineer Finds Gasoline Roller to Compare Favorably with Steam—Equipment Engineer Discusses Some Elements of the Gear Case Situation—Two Articles Treat of Recent Track Practice in Kansas City

(Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.)

Rolling Subgrade with Gasoline Motor-Road Roller

The Cost of Rolling Has Proved to Be About 2 Cents Per Foot of Track

BY R. C. CRAM
Assistant Engineer Way and Structure Department
Brooklyn Rapid Transit System

While subsoil conditions in Brooklyn are generally such that the rolling of subgrade has not been considered necessary, the conditions created by various sewer failures and the many cuts made under old track structures during their life made it seem advisable to adopt the practice of rolling the subgrade in many cases. Before deciding upon the type of roller to be purchased, an investigation was made of both the small steam and gasoline rollers with particular reference to operating and maintenance costs.

ROLLING SUBGRADE WITH GASOLINE ROLLER IN BROOKLYN

It appeared from estimates based on actual cost of operation of several similar rollers of the steam type, taken from the records of one railway company, that the gasoline machine would be the more economical. An eight-ton tandem gasoline machine was accordingly purchased from the Austin-Western Road Machinery Company of Chicago. The accompanying illustration shows the roller in operation. Its use has proved satisfactory and another one has been ordered for next season.

TABLE I—OPERATING COSTS PER DAY OF ROAD ROLLERS

	Gasoline Roller	Steam Roller
Engineer's wages	$2.75	$3.60
Coal	...	1.10
Oil and gasoline	.99	...
Oil and grease	...	.25
Watchman's wages	1.50*	1.65
Water	...	.10
Totals	$5.24	$6.70

Repair cost for steam roller was stated to be about $100 per year. There has been no repair cost in 1915 on the gasoline roller except for batteries.

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*Time of watchman was included in total, although only a small part of the time of one man was required, and this is charged against the job.

TABLE II—COST OF ROLLING SUBGRADE FOR 1322 FT. OF SINGLE TRACK

Operator's labor	$19.25
Fuel and lubricants	6.94
Total	$26.19

Cost per Foot of Track

	Unit, Cents	Total, Dollars
Labor:		
Moving roller to and from work	0.041	$0.55
Rolling subgrade	0.707	9.35
Detentions	0.707	9.35
Material:		
Gasoline	0.508	6.72
Lubricants	0.016	.22
Total	1.979	$26.19

The actual operating costs per day averaged for one year for a gasoline and a steam roller are given in Table I.

The cost per foot of single track for rolling subgrade is found to be about 2 cents, with no allowance for interest and depreciation of the machine, as it is indicated in the statement of rolling costs for one job, which are given in Table II. The cost included in this table covers the use of the roller under heavy operating conditions and the actual rolling time available was from 9 a. m. to 3.30 p. m. daily. This accounts for the item of detentions shown in the table which indicates time in which the machine could not be used.

Rolling Stock Progress in Montreal

Author Traces Steps in the Development of the P.A.Y.E. Car in That City from Its Origin to Date

BY A. GABOURY
Superintendent Montreal (P. Q.) Tramways

That the prepayment system has revolutionized the methods of fare collection is beyond question, and that the Montreal Tramways Company, with which the car originated, is to-day proud of its achievement is also beyond any doubt. It feels that every operating man should have some kind thoughts for the company that through this discovery has helped him out of some of his troubles and the fact that this car is now almost universally used is some recognition of the service it has rendered.

This type of car saw the light of day in 1905 and one made its trial trip on one of our main thoroughfares, St. Catherine Street, on March 30. The first car was of the class shown on the accompanying plate, as Fig. 5. After some opposition the public was soon clamoring for cars of this type, so that they could not be built fast enough to meet the requirements. Some fifty center-entrance cars, ordinarily known here as Scotch cars, were, therefore, immediately remodeled, as shown in Fig. 4. The center entrances were closed and P.A.Y.E. devices were installed on rear and front ends.

Evolution of Pay-as-You-Enter Cars in Montreal

(SEE ARTICLE ON PAGES 1163 AND 1165.)

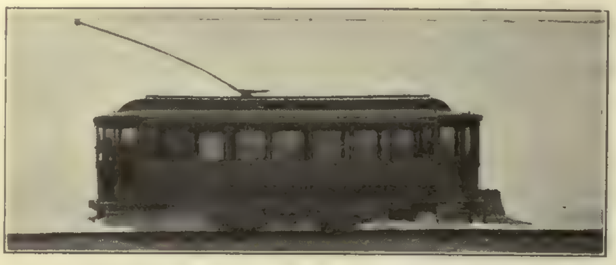


Fig. 1—Old Type Remodeled to P. A. Y. E. Type in 1905, Withdrawn from Service in 1912

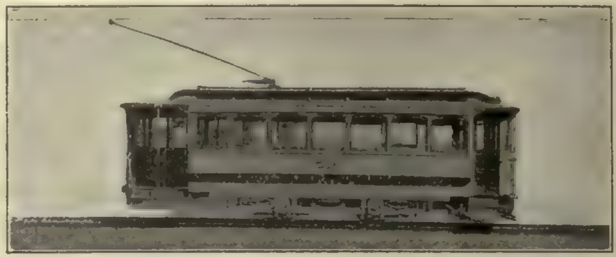


Fig. 2—In Operation from 1896 to 1900, Remodeled in 1905. Withdrawn from Service in 1912

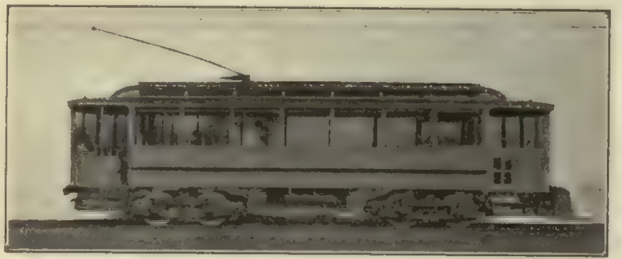


Fig. 3—Built in 1902, Remodeled in 1904

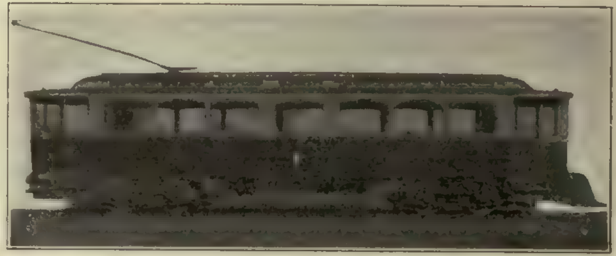


Fig. 4—Built in 1900, Remodeled in 1904

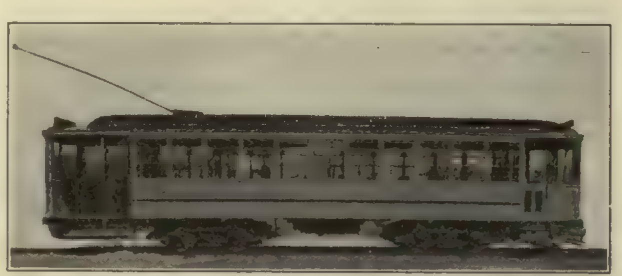


Fig. 5—Built in 1904

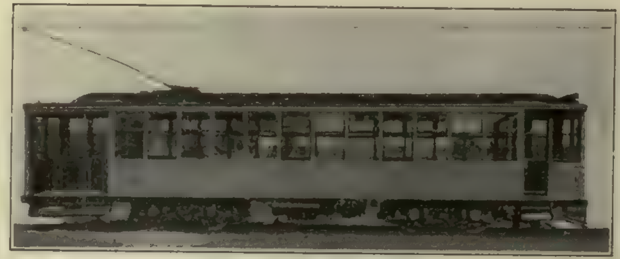


Fig. 6—Built in 1910

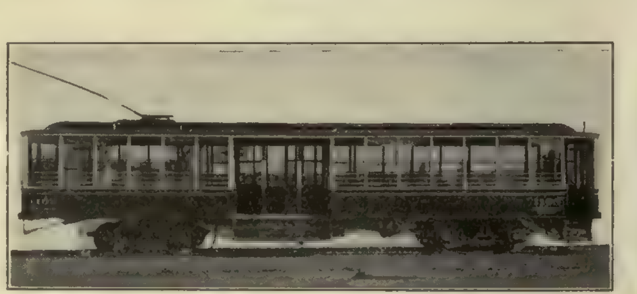


Fig. 7—Suburban Car Built in 1911

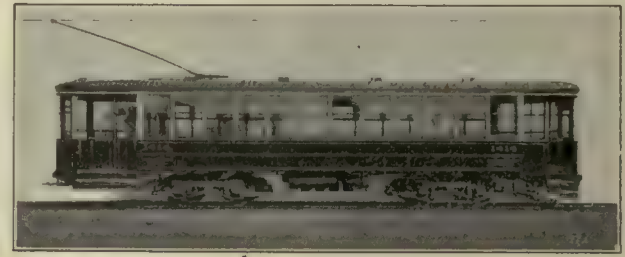


Fig. 8—Built in 1913-1914

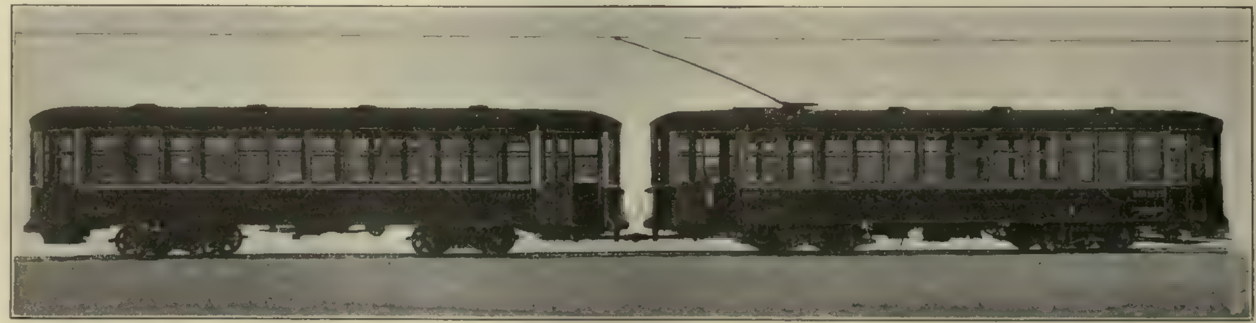


Fig. 9—Built in 1914

Immediately after this, fifty more cars of the type shown in Fig. 3 were also remodeled, and the following year all of our single-truck cars of latest type "went through the mill." Since then they have been replaced by double-truck cars. In a very short period after the first car had made its appearance there were none but P.A.Y.E. cars to be seen in Montreal. But Montreal was expanding rapidly and the demand for cars was increasing in proportion, so that the 701-801-901 classes of cars were built and purchased, the latter two types being of steel construction. A car of the 901 class is shown as Fig. 6.

The large platform of the P.A.Y.E. car, as compared with that of the small cars, was conducive to congestion. The smokers among our patrons preferred to stand on the platform and smoke rather than be seated in comfort inside. We were confronted with a serious problem for this reason, but the city authorities came to our assistance and passed an ordinance in 1913 forbidding smoking on street cars. From that date congestion at the rear ends of our cars disappeared.

Next came the question of adopting the P.A.Y.E. system on suburban cars, where a smoking compartment was a necessity. Cars of the 1100 class, Fig. 7, were designed for this service.

Our summer-service suburban cars of the double-truck 13, 14 and 15-seat open type were also remodeled by closing up the open side, cutting an aisle through the center, closing the vestibules and adding the P.A.Y.E. devices on front and rear platforms. This removed the danger of accidents which existed on account of the running board of open cars. The cars were rendered suitable for summer service as suburban or city cars, while in the winter window sash and heaters were added.

The demand for city service continued to increase and cars of the 1300 and 1400 classes, Fig. 8, were purchased. Then came the last but not the least of our cars, those for operation in two-car trains, Fig. 9. Fifty of this type were purchased. The trains are made up of two different types of car, the motor car being of a pay-within type and the trailer of the near-side type. This gives a double-width loading platform at the point of embarkation.

Folding steps and folding doors are part of the car's equipment. These cars have been in operation for the past two years on our St. Catherine Street, a 16-mile round-trip run, and have proved decidedly popular. This is a trunk line running east and west, fed by all our cross-town lines, running through residential districts in the west end, the main shopping district in the center and residential and manufacturing districts in the east and far east.

All our cars have four-motor equipments, with 50-hp. motors. This is necessary owing to the hilly topography of the city and to the severity of our winter climate.

Rearrangement of Current Collectors for Maintenance Saving

K. L. Wilcoxon, late master mechanic of the Chicago, Lake Shore & South Bend Railway Company, recently began the rearrangement of the current collecting equipment on his passenger cars to minimize the trouble and maintenance on these parts. The passenger cars were formerly equipped with a trolley stand over each truck and a pantograph trolley in the middle of the car. One trolley stand is taken off in the rearrangement and the pantograph moved to the better position over the truck. This has a tendency to make the pantograph follow the wire in better shape. The jumper cable between trolley stands is cut out altogether, thus eliminating 65 ft. of 6600-volt cable and conduit on the roof of the car. With the position of the pantograph over the truck a much shorter air line to operate it is required, and hence it responds more readily to the air lifting and lowering, and the maintenance on one trolley stand is eliminated.

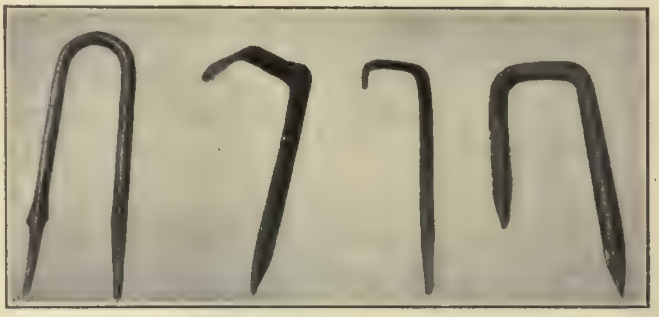
Protecting Rail Bonds from Theft

The Author Discusses the Difficulty of Preventing Theft of Long Bonds and Recommends a Certain Form of Staple for Fastening Them to Ties

BY G. H. MCKELWAY
Line Engineer Brooklyn Rapid Transit System

The problem of preventing theft of unprotected cable bonds is emphasized by the present high price of copper. There are some types of bond protectors so made as to cover bonds of the shorter types but the writer has never seen any made for long bonds, and even the ones for the short bonds are not wholly satisfactory as they are bolted on with the same bolts that hold the joint plates. If they are removed to permit of repairs to the bonds the plates are loosened and cannot be made to fit as tightly to the rails as before.

The most satisfactory form of protection would appear to be the placing of the entire bond under the splice plate far enough away from the ends of the rail or the bolt holes to avoid weakening the rails, and with the bond long and flexible enough to prevent the breaking of the strands and the loosening of the terminals. While this type of construction may be slightly more expensive than others, the bonds so installed should last as long as the joint.


No. 1 No. 2. No. 3 No. 4
TYPES OF STAPLE FOR USE IN ATTACHING LONG BONDS TO TRACK TIES

Long bonds may be installed under the joint plate, the plate being made with sufficient clearance to prevent the crushing of the bond even after long service when the plate has been drawn closer to the web of the rail than when first installed. Although few rail and joint sections will give this clearance, yet it will be found in some, including the present American Electric Railway Association standard.

Sometimes to avoid the drilling of the bond holes between the holes for the bolt holding the joints, or to render easier the renewal of defective bonds without disturbing the plates, long bonds are installed under joint plates with the terminals outside. This affords very little protection because, as soon as the terminals are cut off, the bonds can be withdrawn from under the plate. The bonds should be installed with the terminals as well as the strands protected.

Where long exposed bonds are used, many companies have adopted the plan of stapling the bonds down to the ties. The accompanying illustration shows four types of staple which have been tried out carefully by one company. Although no staple was found to be perfectly satisfactory, the best results were obtained from the type marked No. 4. All the staples were $3\frac{1}{2}$-in. long and their price varied from 40 to 95 cents per gross when prices were normal.

Type No. 1 made a satisfactory job but did not drive well into the tie. Type 2 was easily driven but not strong enough to hold the bond when the latter was pulled vigorously. The only fault to be found with type 3 was in the short leg which was not long enough to enter the wood to a sufficient distance, and the bond was apt to be damaged in the endeavor to bury the short leg in the wood.

The trouble with a staple is that unless it is driven down far enough to bind the bond to the tie, the bond can be stolen by cutting off or knocking out the terminals from the rail and then pulling the bond through the staple. If the staple is driven down so far as to prevent the movement of the bond it is liable to cut into or through some of the strands. Even if this does not happen it will be necessary to hold the bond so tightly that it will be affected by vibration and the strain will be broken off in the neck of the terminal in the course of time. Of course this will not happen if the bond is fastened to the tie by only one staple at the center, but then it is not greatly protected. It is evident then that the practice of stapling long bonds may reduce danger from theft but is apt to shorten the life of the bond. As mentioned earlier, the best plan is to protect the bond completely by means of the splice plates.

Sheet-Steel Gear Cases

The Author Discusses the Points Raised in Article Published by "Vulcan" Last Week

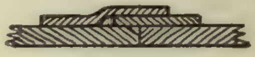
BY C. W. SQUIER

I have read with much interest the article by "Vulcan" on "Gear Case Maintenance" which appeared in the Electric Railway Journal of Nov. 25, page 1116. From this I infer that the sheet-steel gear case has not proved entirely successful when installed on surface roads in England, due to rivets working loose and seams opening up with excessive vibration and other damage caused by small clearance from the roadbed. I have found track conditions in England to be much better than those on the average surface lines in this country. It is a striking fact that a great many English roads operate electric track brakes with but a clearance of $\frac{1}{4}$ in. above the track rails.

Operation with any such clearance as that indicated would be impossible on most roads in this country. It is not to be wondered at then, that the experience of operating engineers here was much the same as outlined by "Vulcan," with the first types of sheet-steel gear cases brought out. Cases with rivets and welded seams soon fell apart and many of the dissatisfied operating officials who tried out the built-up riveted and welded cases returned to the use of the malleable iron types. Manufacturers of motors were anxious to comply with their customers' demands for lighter equipments and they realized that gear cases offered a fruitful field for reducing weight. As a result seamless drawn-steel gear cases became popular and are now supplied with the late types of both Westinghouse and General Electric motors. Large numbers of these cases have now been in service for upward of three years and a number of the roads using them report that satisfactory results have been obtained.

The obtaining of satisfactory service from gear cases depends on several factors besides their construction, so that the results obtained on different roads show a wide variation. As already stated the condition of the track plays a very important part in the life obtained, and another important factor is the securing of proper clearance from the roadbed. With the advent of the low-platform and low-step cars, the use of small diameter wheels has been necessary. This has unduly reduced the clearance between gear cases and roadbed in some cases.

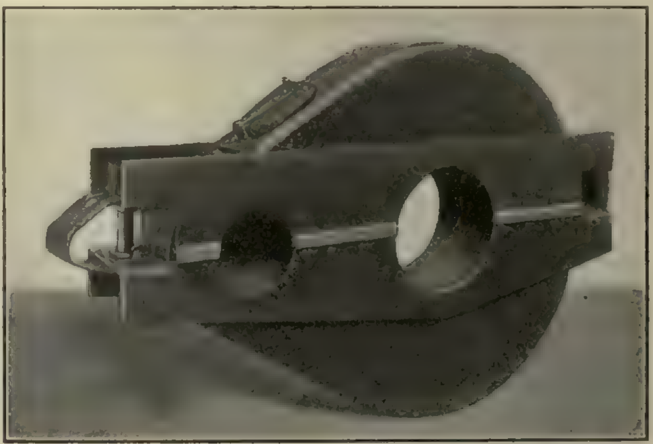
In comparing results obtained with sheet-steel gear cases I find without exception that subway, elevated and other roads operating on T-rails are obtaining satisfactory service, and another road operating new cars with new equipment on the surface reports very little gear case trouble. This may be due partly to the fact that the wheels are still near their maximum diameter and the clearance has not been reduced to the allowable minimum.



TONGUE-AND-GROOVE JOINT IN SHEET STEEL GEAR CASE

The method of suspension also has an important bearing on the life of the gear case. The two-point end suspension throws less strain on the gear case and its supports than the older type of side suspension. As pointed out in the article by "Vulcan," vibration causes a crystallization of the iron used for hangers and suspension brackets, and these then break when a severe strain is thrown on them. The two-point suspension prevents excessive lateral vibration and strains and provides an increased flexibility for the case should it strike an obstruction. This type of suspension has been used by the Westinghouse Company on its motors for many years.

An accompanying illustration shows the latest type of pressed-steel gear case now being supplied with the motors provided with this suspension. The channel shaped supports at either end of the case are in turn supported by large sheet steel plates running the entire length of the gear case and spot welded to the sides of it. Safety straps are provided, which support the lower half of the gear case should the nut come off the connecting bolt. This feature will prevent many cases from being damaged.



SEAMLESS DRAWN-STEEL GEAR CASE WITH TWO-POINT END SUSPENSION AND SAFETY STRAPS

The pavement over which surface cars operate is another factor in the damage done to gear cases. Paving stones are loosened by thawing and freezing conditions and forced above their normal surface. Ice and snow also forms an obstruction for damaging the case and throws additional strains on the gear case supports.

A source of annoyance in connection with the maintenance of gear cases is the working out of gear grease at the openings provided where the case clamps the wheel hub, the axle bearing and the armature bearing, and also where the halves of the case join. The usual method of providing felt rings to close the openings aids to some degree, but these are sometimes torn off or become damaged or worn so as to lose their value. The sketch on page 1166 illustrates the tongue and groove method of closing the joint along the split of the two halves of the case which forms an effective barrier to dust, moisture and grease. Some engineers are advocating the manufacture of an oil-tight gear case so that the gears can be flooded with oil instead of using a grease which is usually found in the bottom of the gear case instead of on the gears. The clearances provided with the present design of motors for the gear case are so small that an oil-tight case appears impossible. On new designs of motors, however, some method of combining the bearings on the gear case end with the gear case might be advantageously worked out.

The principal advantage of sheet-steel gear cases is their lightness. This saving in weight is not so great with small motors as with large ones. The pressed-steel gear case supplied with the Westinghouse No. 333 motor of 150-hp. capacity weighs 115 lb. as against 195 lb. for the wrought-iron type, saving in weight of 80 lb. The pressed-steel case for the Westinghouse No. 306 motor of 60-hp. capacity weighs 95 lb. against 130 lb. for the wrought-iron type, or a saving in weight of 35 lb.

Gear cases should be of sufficiently rugged construction so that they will not shake apart due to vibration, but we must expect a certain amount of damage to light cases by striking obstructions. Of the types of sheet-steel gear cases now being supplied the seamless pressed steel type has proved the most satisfactory.

Tamping a Tie a Minute with Air Tampers

With labor particularly scarce and the need to push the extension of a line to completion, the Kansas City (Mo.) Railways resorted to a scheme for speeding up the work with machinery. An Ingersoll-Rand pneumatic tie-tamping outfit was brought into use and has proved to be very successful. The equipment complete consists of a 100-cu. ft. capacity, triple cylinder, upright air compressor, producing 90 lb. pressure, electrically driven by a 550-volt, 18-hp. motor. The compressor, the air-storage reservoir and a tank for cooling water for the compressor are mounted on a single-truck car to facilitate moving from place to place. The outfit includes four pneumatic tamping hammers which in reality are the ordinary riveting handles used in structural steel work with the rivet head replaced by special steel tamping heads. These in appearance and construction, are much like the old-fashioned heads in use on tamping bars and tamping picks.

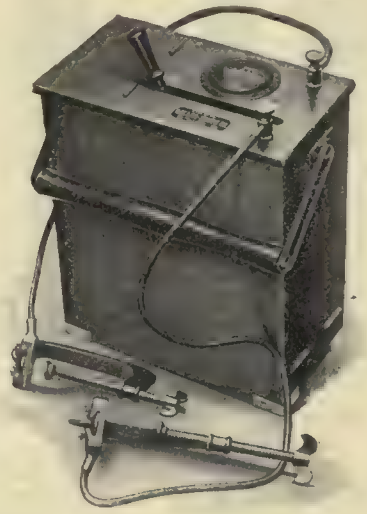
TIE TAMPING EQUIPMENT IN USE ON THE KANSAS CITY (MO.) RAILWAYS

The compressed air is carried from the storage reservoir to each tamper by a ½-in. rubber hose and is controlled by the usual valve located near the hand grip of the tamper. Using these machines on the new Marlborough line during the last four months, four track workers made a record for a day's work of 600 ties tamped in ten hours, equivalent to one tie a minute. The average day's work with this same force was 500 ties every ten hours. The ballast used on this track work was crushed limestone. A. E. Harvey, superintendent of way and structures, states that he had experimented with no other kind of ballast, but felt positive that the air tampers would work satisfactorily with any kind of ballast.

Portable Battery Equipment for Bond Tester

The Roller-Smith Company, New York, N. Y., has just placed on the market a portable storage-battery equipment for use with its bond tester. The containing case, as shown in the illustration herewith, is 12 in. wide by 7 in. deep by 15 in. high and weighs approximately 45 lb.

This equipment comprises an Edison A-5 storage battery of 187.5 amp.-hr. capacity, as the source of current; an ammeter, range 60-0-60 amp., to show the rate of battery charge or discharge; a rheostat the first step of which is an open-circuit step, the succeeding steps being used for establishing and bringing to correct value the rail current; and a knife-blade switch for interruption of the circuit while moving the tester from joint to joint. A compartment for carrying the cables and clamps is also provided.

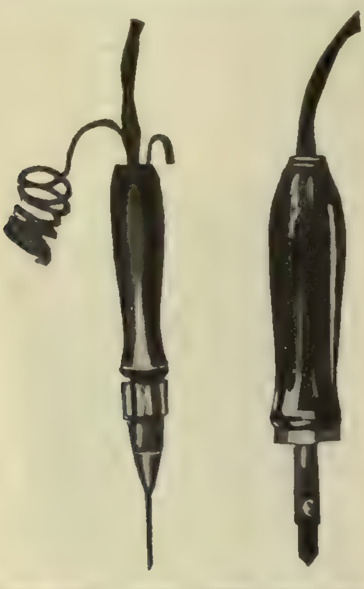

PORTABLE BOND TESTING STORAGE BATTERY

Impregnated Switchboard Stone

Lin-Stun, which is a natural stone, impregnated with an insulating compound to render it entirely moisture-proof and increase the insulating resistance, is now being manufactured by the Lin-Stun Company, 5010 Gloster Street, Pittsburgh, Pa. The maker states that tests have been made with 125,000 volts on pieces 1 in. thick without puncturing the stone. This material is especially adapted for switchboards, panelboards, barriers, insulated walks and such other uses as require a board to resist moisture, high voltage and large currents. It is being made in all commercial sizes and thicknesses and in several colors.

A Recent Type of Soldering Iron

The generation of heat at the point of contact and at the spot where the heat is needed for soldering, brazing or annealing purposes, is the basis for the design of an electric soldering iron now made by the Clemens Electrical Corporation of Buffalo, N. Y. Another feature claimed for this iron is that the operator need not wait for the iron to get hot, since the instant the object to be soldered or brazed touches the two high-resistance heating points, these points glow with a white heat directly at the tips where the heat is needed. The moment the tool is taken from the work, after the object is soldered, the current ceases to flow, as the circuit between the high-resistance points is opened. The high-resistance points when they become used can be readily renewed at a small cost. The prongs are made of solid bar brass with nickel-plated finish and accurately machined. In the two-prong iron, the bushing that holds and separates the prongs is made of molded asbestos. The handle is made of bakelite, compressed under 600 deg. Fahr.



LOW VOLTAGE SOLDERING IRON WITH HIGH RESISTANCE TIPS

This soldering iron operates on low voltage, the range being from 6 to 15 volts. The high-resistance points are made to carry current according to a rating of 150 watts, 250 watts and 500 watts.

A two-handle portable outfit is made which consists of a single-prong soldering tool attached to one wire of the secondary side of a transformer, and a soldering feed tool attached to the other secondary wire of the transformer. The single-prong point is brought to bear upon the object to be soldered and solder-feeding tool is placed on the spot when needed. This outfit is especially adapted for special jobs of soldering, such as big wires behind switchboards as well as for general repair work.

Rebuilt Concrete Mixer Makes Good Device for Cleaning Old Ballast

With the prevailing high cost of ballast rock a neat saving is to be had through the cleaning of old ballast and reusing it. For this purpose, the Kansas City Railways have devised a portable rotary screen from a made-over obsolete continuous concrete mixer, with a revolving screen substituted for the mixing trough and blades. This old rotary grout mixer was dismantled and the ends of the circular screen attached to the mechanism which formerly rotated the blades and mixer. This screen is about 6 ft. in length, and tapers from 18 in. in diameter at the motor end to about 3 ft. at the discharge end. The same gasoline engine which formerly drove the mixer now serves as motive power for the circular screen. The ballast, salvage from track under reconstruction, or other material to be screened, is thrown into a wooden hopper built in at the small end of the screen, and carried by gravity, as the screen turns, down toward the discharging end. In passing over the meshes of the screen, the dirt and foreign matter is loosened from the rock and sifts through to the ground below where it is taken up by workmen and carried away. The rock discharged at the end of the screen is clean and of good quality for concrete grout purposes.

OLD CONCRETE MIXER BUILT OVER INTO SCREEN FOR CLEANING BALLAST

The whole machine is mounted on a portable steel-wheeled truck, making it possible to transport it easily from one job to another. The company has used this home-made device on various parts of the system, and has found it to be very satisfactory and to have saved its cost many times.

Chicago Elevated Steel Cars Show No Deterioration After 100,000 Miles

The all-steel cars of the Chicago Elevated Railways, which were ordered in December, 1913, and received beginning in July, 1914, are now being put through the shops for the first general overhauling after having been run 100,000 miles. In speaking of this, H. A. Johnson, master mechanic, said that the cars were being taken down and carefully inspected, but that the men were finding practically nothing to do on the body, trucks, or any of the equipment.

LONDON LETTER

Efficiency Meetings in London—Belfast Earnings for Six Months Reviewed—Edinburgh Experts Report

(From Our Regular Correspondent)

The first of the London Underground and the London General Omnibus Company's operating department efficiency meetings for the season 1916-1917 was held on Oct. 30, in the London General Omnibus Company's training school at Chelsea, with H. E. Blain, the operating manager, presiding over an audience of about 200 officials. An address on "The Camera and the Cinema in the Operation of Transit Companies" was delivered by Capt. A. Rozier, superintendent of training and employment of the London General Omnibus Company, who contrasted the haphazard and inefficient training in operation in the horse vehicle days with the scientific and practical instruction received now by all those who deal with passenger transit. The effect of this training was clearly shown by the reductions constantly taking place in the number of accidents, notwithstanding the present abnormal difficulties in connection with street lighting, etc. The use of the camera and the cinema in this instruction is very prominent in the company's school, and many slides and films were exhibited.

The working of the Belfast city tramways for the first half of the present financial year, namely, from April to Sept. 30, has resulted in a surplus profit of £3,883. For the same six months of last year the surplus was £8,380. The revenue for the six months was £151,980, as compared with £141,580 for the corresponding period of last year. This is an increase of £10,400 earned without any appreciable increase in the car mileage. The car-mile unit of receipts for September, 11.93d., was the highest in the history of the undertaking. On the other hand, the working expenses, 7.03d., reached the highest point also. For the six months ended Sept. 30 the receipts per car-mile were 11.58d., as against 11.01d. for the same six months of 1915. Working expenses during the six months increased from £78,189 to £89,723, or more than £11,000. This more than wiped out the increase in revenue. There was an increase of more than £1,800 in net revenue charges and of nearly £2,000 in sinking-fund charges. These increases, which are due partly to additional capital expenditure and partly to additional income-tax charge, reduced the surplus profit to £3,880. The heaviest item of increase in the working expenses was in power, for which the charge was £20,824, as against £14,649, an advance of more than £6,000 in the six months. Traffic wages increased £2,000, war pay increased from £3,700 to £4,400, the car works cost £1,800 more, and the permanent way and electrical equipment £1,300 more. Mr. Moffet, the new general manager, has now taken charge of the undertaking. He assumes control at a period when financially the concern is anything but flourishing, although the traffic is steadily expanding.

The full report by the experts selected to advise the tramway committee of the Corporation of Edinburgh, namely, J. A. Brodie, city engineer of Liverpool; J. B. Hamilton, general manager of the Leeds Corporation Tramways, and A. H. Campbell, city engineer of Edinburgh, has now been submitted to the Edinburgh Town Council, and differs very little from the curtailed statement published a month or two ago. The report shows that there was possible of adoption electric traction by overhead, the conduit, the surface system, the self-propelled petrol or petrol-electric cars, the electric storage battery car, and the motor 'bus. It is pointed out that overhead wires are not an innovation in Edinburgh, and that cities like York and Chester, and pleasure resorts such as Bournemouth and Southport, have adopted the system with good results. As applied to Edinburgh the experts estimated that the cost of installation of the overhead system, restricted to the existing tramway routes, would be £400,000 for permanent way and electrical equipment of the tramway. The cost of installation of the conduit system, restricted to the existing cable routes, would be £850,000 for street work only. In regard to the self-propelled car, it is thought that it would not provide a satisfactory or economic service for the entire city. The motor bus might become a serviceable and suitable auxiliary to the tramway system. The experts do not think it advisable or necessary to retain the cable for any route in the city. In recommending the overhead electric system it is suggested that the conduit system should be applied to Princess Street from the Register House to the West End. In the event of that system being adopted, it is further suggested that an alternative line be provided in Queen Street. In a summary the report states that, independent of the existing tramway conditions of the city, the overhead system offers the best, most reliable, convenient and economical solution of the transit requirements of the city and suburbs.

In a recent interview, Mr. Blain, the operating manager of the London General Omnibus Company, stated that several hundred more girl bus-conductors were wanted by the company. The company had to contradict several reports that the girls were unable to stand the strain of the work and were leaving the employ of the company. The actual position was that every week the company put on about eighty new conductresses, and would increase the number if it could. In the service at the present time there are more than 1150 girl conductors. Each pupil receives not only free tuition for a period of two or three weeks, but is paid 2s. a day for her time. After the girls have qualified the average earnings run to about £2 a week. There is no abnormal sickness among the girls. They like the work and benefit in physique and complexion by the open-air life. They are all under the care of a woman physician. Since March the company has interviewed 16,000 applicants. Among the ranks of the women seeking employment almost every class is represented. Owing to the careful training of the men drivers and the company's safety first campaign, there were 25 per cent fewer accidents in the streets than before the war. Nearly half the drivers were trained during the war, so that their record is a splendid one, considering the condition of the streets at night.

The proposal that Glasgow should proceed with the erection of a new electric generating station gives further proof of the enormous and growing demand all over the country for power purposes. While no local authority in England has been allowed since the early days of the war to raise fresh loans or incur large capital expenditure without the consent of the Local Government Board, the necessity for additional electric power has become so urgent and widespread that for some time the department has been granting to many English municipalities authority to borrow money with which to extend their electricity undertakings.

The British Electrical & Allied Manufacturers' Association announces that the department of import restrictions (Board of Trade) has granted to the association a special license to import insulating materials in certain classes which are included in the list of prohibited imports. Electrical manufacturers, whether or not they are members of the association, can avail themselves of this license by making application to the secretary of the Manufacturers' Association.

The numerous stoppages on the Birmingham tramways received special consideration at a recent meeting of the electric supply committee of the City Council. The inconvenience to the public of stopping the cars suddenly and for prolonged periods was fully recognized, and the matter had been discussed at an interview between Mr. Chattock, the engineer to the electricity department, and Mr. Baker, the manager of the tramways. The conclusion arrived at by these gentlemen was that it would be better not to issue any definite notice as suggested. The reason for this was that it was certain there would be a sufficient supply of current to enable the cars to run until 9.30 a. m., and again from 6 p. m. onward, as well as during the dinner period from 12.30 p. m. or thereabouts until after 2 p. m. Another matter which occupied the attention of the committee was the general question of the supply of current throughout the city. Deliveries of plant have been delayed, and this, with a depleted staff, is largely the cause of the inability of the department to cope with the demands made upon it. Steps are being taken to secure additional equipment before Dec. 15. When that has been accomplished it is hoped that the difficulties of the committee will come to an end. A. C. S.

NEWS OF ELECTRIC RAILWAYS

Traffic and Transportation

Financial and Corporate **Personal Mention** **Construction News**

COMPROMISE OFFER TO ST. LOUIS

Company Acknowledges Its Liability for the Mill Tax, But Asks City to Withdraw Its Franchise Contention

The United Railways, St. Louis, Mo., through its committee appointed to confer with an official city committee to discuss a settlement of the mill tax and franchise problems, at a meeting in Mayor Kiel's office on Nov. 22, made a definite proposition of compromise to the city. The proposal was offered by Richard McCulloch, president and general manager of the United Railways, and contained the following plan of settlement:

1. The United Railways, in settlement of its differences with the city, will acknowledge liability for the accrued mill tax up to and including Dec. 31, 1916, aggregating about $1,500,000.

2. The city to accept payment of the accrued mill tax in annual payments. The amount of the yearly payments to be decided on by the joint conference committee. The first payment to be made Dec. 31, 1916.

3. The city to reduce the present mill tax to an equitable amount, taking into account present operating conditions, to become effective Jan. 1, 1917.

4. The city to withdraw its attack on the validity of the franchises of the United Railways lines, and to confirm the terms of the franchises to extend to April 12, 1948.

5. The joint conference committee, when the details of the compromise are agreed upon, to recommend to the Board of Aldermen the enactment of the necessary legislation to accomplish these results.

The United Railways was represented at the conference by President McCulloch, Murray Carleton and A. L. Shapleigh. The city was represented by Mayor Kiel, President-elect Aloe of the Board of Aldermen, Acting President Nat Hall and the public utilities committee of the Board of Aldermen.

A subcommittee composed of Messrs. Aloe, McCulloch, Carleton and the seven members of the public utilities committee of the Board of Aldermen was appointed to verify the statistics presented by Mr. McCulloch as to the company's financial condition and report back to the joint committee.

No date for the next meeting was set. Mayor Kiel suggested that the subcommittee should report in about two weeks. Alderman Gregory, chairman of the public utilities committee, which dominates in numbers the subcommittee, indicated it would take much longer than two weeks for a report.

Mr. Gregory said after the meeting that the subcommittee would not make a report until after it has held a series of public hearings to determine the sentiment of the public and that these hearings will not begin until after Jan. 1.

The company published in the St. Louis papers of Nov. 23, in the form of a full-page advertisement, the complete plea for a settlement as presented to the city. In explaining its purpose the company said:

"We are not coming to you with a legal argument; we are not pleading for this settlement as a matter of legal rights, but we are pleading for it as a matter of good business policy, both for the city of St. Louis and for the United Railways. There is nothing technical in the arguments which will be submitted and there is nothing at issue which may not be passed upon by business men without the aid of technical experts."

The company said that the differences between it and the city were two in number. These it stated as follows:

"1. The mill tax matter. The city is attempting to collect a 2 per cent tax on each cash passenger originating in the city limits in addition to all other taxes now paid. Judgment was obtained and affirmed by the Missouri Supreme Court and the United States Supreme Court for the taxes up to 1910, amounting, with interest, to $1,839,205. This sum was paid the city on June 16, 1916. The city has brought suit for the accrued taxes since 1910, amounting, with interest, to date to about $1,500,000. The annual tax on present earnings is about $240,000.

"2. The duration of the franchises. The city contends that the franchises expire as specified in the original ordinances. The company contends that all these franchises were extended to 1939 by the St. Louis Transit franchise and to 1948 by the Central Traction franchise. The railways company has won its contention in the Circuit Court and the matter is now pending on appeal in the Missouri Supreme Court."

In its plea the company said that "it is our earnest desire to reach a settlement with the city by which both of these differences may be adjusted in a manner fair and equitable to both parties."

Among the subjects other than those mentioned upon which the company touched in its advertisement were taxes, service, rate of fare, duration of franchises, necessity for new capital, bond issues maturing, necessity for refinancing maturing bonds, possibility of receivership, value of transfer system, and service. These were followed by the five proposals mentioned at the outset of this article. In conclusion the company said of its proposal:

"We consider this proposition fair and reasonable.

"We ask the city to withdraw its contention as to the expiration of our franchises because this contention casts a cloud upon the franchises and prevents the financing which is necessary for our continued existence and progress. It is becoming more and more difficult to get capital to invest in street railway enterprises, and it would be greatly to the advantage of the city of St. Louis if capital would be attracted to this city.

"We propose to acknowledge our liability for a tax which we have heretofore fought as unjust and unreasonable.

"We are not asking to be relieved from the payment of 1 per cent of the accrued taxes, but we do ask for time in which to make this payment.

"We ask relief from the payment of a portion of the future tax, because the payment of the full tax will affect our service, and we consider the maintenance of this service our first duty to our patrons. Furthermore, the payment of the full tax is not justified in comparing our taxes with those paid in other cities."

DALLAS VOTE IN FAVOR OF FRANCHISE

The straw vote on the indeterminate franchises to be granted J. F. Strickland and C. W. Hobson, who are to take over the electric traction and electric lighting properties of Dallas, Tex., is reported to be going overwhelmingly in favor of the franchises. The vote so far tabulated when this account was mailed by the correspondent of the Electric Railway Journal in Dallas amounted to more than 60 per cent of the number of postcards sent out, and probably more than 90 per cent of the total vote to be cast. It showed about 97 per cent in favor of the franchises. Of the other 3 per cent, fully one-third are not counted because of defective ballots, leaving but a very small percentage of negative votes.

While the franchises will undoubtedly be approved in the straw vote, Mayor Henry D. Lindsley and members of the Board of City Commissioners have indicated that they will not formally pass the franchises until there has been a referendum vote on the franchises, as provided in the City Charter. It will perhaps take several months for this referendum vote.

CITY ENGINEER ON SAN FRANCISCO SITUATION

In the annual report just issued by the city engineer of San Francisco, Cal., considerable space is devoted to the municipal railway. After reviewing briefly the history of the municipal railway project and recent earnings, the report mentions the several extensions that have been constructed and others that are contemplated. The most important of the latter is referred to as follows:

"Upon the recommendation of this office, the supervisors have appropriated $275,000 from the surplus earnings of the municipal railway system for the purpose of constructing the track and overhead work through Twin Peaks tunnel from Seventeenth and Market Streets to the junction of Sloat and Junipero Serra Boulevards."

In conclusion the report states:

"The street railway situation in San Francisco presents a number of serious problems. The track mileage in the city is more than five years behind the needs of the present population. It is difficult to extend the street railway facilities logically or economically because of the fact that all of the railway lines are not under a unified control. The city cannot force the United Railroads to make any extensions, nor will the United Railroads make any extensions of its own volition under existing charter conditions. Many extensions are at present desirable, but without suitable connections or transfer arrangement with both the Municipal Railway and the United Railroads system would be of little real benefit. The more carefully the situation is studied the more urgent appears the necessity for the unification of control of all the existing lines, and until this has been accomplished San Francisco will have to put up with a more or less inadequate transportation system.

"This office at the present time is studying the problem and expects to make a report shortly outlining a logical program for future extensions of the existing Municipal Railway System, but at best the construction of these extensions will fall short of solving the transportation question in San Francisco, for the solution of this problem requires consideration on broader lines. The time is fast approaching when a rapid-transit system must be considered. This would be either of subway or elevated type, preferably the latter at this stage of our development, the comparative costs being about $800,000 a mile for the elevated as against $3,500,000 a mile for the subway construction. The first link in a rapid-transit system naturally should parallel Market Street, connecting with the Twin Peaks tunnel and with a branch extending south through the Mission in the vicinity of Capp Street."

HEARINGS PROPOSED ON STRIKE PREVENTION PLAN

Chairman Oscar S. Straus of the Public Service Commission for the First District of New York, will preside at a series of public hearings to develop a plan to eliminate strikes of employees of public service corporations and to formulate a plan of pensions. Mr. Straus says that in order to perfect certain details that would have to be known before a proper bill could be drafted for submission to the Legislature the views of all of the persons concerned ought to be heard in as public a fashion as possible. The main feature of the idea is to have enacted a law for the appointment of a wage commission that should have absolutely the last say in all disputes between employers and employees. The rate of pay fixed by the commission should be the rate each corporation would have to pay to its employees, and the employees would also have to accept the decision of the commission. Some plan of penalizing both sides in a controversy that resulted in the violation of the commission's order would have to be worked out later. If a corporation should protest against the rate on the plea that it could not afford to pay it, then the Public Service Commission in the district where the corporation was located would have to find out whether the rate fixed was too high for the earnings of the company to pay and still provide the stockholders with reasonable dividends. In case the corporation was an interstate concern then the Interstate Commerce Commission would be called upon to make this investigation. If the investigation resulted in proving that the corporation could not afford to pay the wages set by the wage commission, then the Public Service Commission or the Interstate Commerce Commission, having control over the corporation, should permit it to increase its charges to a point where it could pay the wages set.

REPLIES TO ITS TRADUCERS

The Public Service Corporation of New Jersey, in Unusually Direct and Forceful Manner, Spreads Its Cards on the Table

The election over, the Public Service Corporation of New Jersey has addressed a statement signed by Thomas N. McCarter, president of the company, to the people of New Jersey. This statement, as it appeared in the form of a four-column, page-deep advertisement in the Newark *Evening News* of Nov. 23, follows in full:

"During the recent campaign a number of the candidates for office, including one of the candidates for Governor, one of the candidates for Mayor of Newark, and one of the candidates for the State Senate in Essex County, went up and down their respective constituencies seeking political capital for themselves by attacking this corporation.

"They did not confine their malicious attacks to their public speeches, but the newspapers of the State were filled with paid advertisements of the same general character, either inserted or promoted by them. One of the chief bases of their attack was the allegation that this corporation maintains at Trenton during the legislative season a pernicious and corrupt lobby for the purpose of improperly influencing legislation. This corporation does no such thing.

"As long as conditions remain as they have existed in the past, and as they are at present, the corporation will, if I can control it, send its officers to Trenton to represent it in a legitimate, straightforward way, in the light of day.

"The corporation is seldom interested in any affirmative legislation. When it is so interested it goes about the matter in precisely the same manner that any other company or individual would do under similar conditions, but every year more than 10 per cent of the bills introduced in both houses of the Legislature are bills which, intentionally or otherwise, directly affect the property and rights of Public Service. There are tax bills, there are rate bills, there are confiscation bills, and there are strike bills, in all more than 100 every year.

"Those of us chargeable with the responsibility for the management of the affairs of this corporation would, indeed, be recreant to our trust if we did not exercise the American right of free speech in reference thereto. It is a matter of every-day experience for delegations of the public, of all kinds, to go to Trenton to exercise their influence in favor of or in opposition to this or that measure pending before the Legislature. It is frequently an act of patriotic service for one thus to participate in legislative councils. According to our traducers, when we seek in the same manner to protect ourselves from the character of legislation above referred to it is not an exercise of right but an act of scandalous lobbying.

"When the theorists, the demagogues and the fakers cease attacking the corporation in the manner above indicated we shall be only too glad to be relieved of the vexatious burden of self-protection.

"This corporation is honestly trying to carry on a great work of upbuilding development throughout this State from which it is only seeking a reasonable return commensurate with the risks and effort involved. This, I believe, the people of the State are rapidly realizing to be the truth. At all events, it would not seem as if the making of Public Service the feature of their campaigns had been particularly successful, as two of the three gentlemen above referred to were overwhelmingly defeated for the offices they sought, and the third, while elected, ran many thousand votes behind his ticket. Throughout the campaign this corporation remained altogether silent on the subject.

"In all fairness, is it not about time that this kind of thing stopped, and that politicians who seek to ride into office through attacks on this corporation should at least make statements of fact, and not reiterate false insinuations?"

REASSURANCES ON CLEVELAND RAPID TRANSIT PROJECT

W. R. Hopkins, president of the Cleveland (Ohio) Rapid Transit Company, has written to the City Council of that city in regard to the prospects for building the proposed road, construction rights for which were granted some time ago. The substance of the letter of Mr. Hopkins follows:

"At the time the matter was last brought to your attention, we requested and you granted modifications of the ordinance to meet the requirements of parties to whom we had committed the financing of our project and who had assured us that these modifications of the ordinance would remove the last obstacle in the way of the financing of the first two lines. We had previously met all other requirements and, with your co-operation, the last requirement was met fully and promptly, but the assurances then given us and the others subsequently given were not made good. We have therefore terminated all previous arrangements and negotiations, adopted a new plan of financing and are proceeding upon new lines, with excellent prospects of success. At this moment the most serious obstacle in the way of proceeding with construction work at an early day lies in the great increase of construction costs. Our latest estimates of cost for the first line exceed by upwards of $3,000,000 the price at which responsible parties were prepared to do the work at the time the ordinance was last amended. Such an increased cost, although due in large part to temporary conditions, involves a large permanent increase in the fixed charges which would have to be carried by a line constructed at such cost.

"However, Cleveland's need of real rapid transit is now so evident and the city's growth so assured, we are convinced that the project can, if necessary, carry even these increased burdens and so justify the increased investment. Acting upon this faith, the company is more determined than ever to proceed with its efforts to provide a system of subways for the city of Cleveland, in accordance with the plans embodied in the legislation hitherto passed by your honorable body, and we beg to assure you that we shall continue our efforts in this direction until we have accomplished the result or you shall determine that the city can secure it more quickly by other means."

TOLEDO CONFERENCES ADJOURNED TO DEC. 5

The street railway commission of Toledo, Ohio, adjourned on Nov. 22 to Dec. 5, after failing to agree on the amount that should be paid down in case the city decides to take over the street railway property of the Toledo Railways & Light Company at the expiration of five years. The tentative franchise provides for an initial payment of 15 per cent. Henry L. Doherty, however, refused to consider so small a payment. He said 25 per cent was the smallest amount to which he could agree, and, for the safety of the city in an undertaking of this kind, it should be more. John Thurston, president of the commission, contended for 15 per cent, but finally offered to compromise at 20 per cent. Mr. Doherty refused.

N. D. Cochran, of the commission, said that 25 per cent was a much smaller sum than he ever dreamed Mr. Doherty would be willing to accept. He thought the city was fortunate in receiving an opportunity to participate on so liberal a basis. Commissioner Wright agreed with him but Commissioner Usher objected.

Mr. Doherty explained that a profit of 1 cent a passenger would in five years yield $3,600,000 for making an initial payment, while only $2,500,000 would be required for such payment. Judge Emery expressed the belief that the city charter could be so amended as to allow the issue of bonds for this purpose, but the matter had not yet been tested in the courts.

An agreement was reached on Nov. 21 to the effect that the city may relieve the company from the cost of paving streets between the tracks, but the money must be used as part of the purchase fund.

Commissioner N. C. Wright proposed that the sliding fare clause be changed so that the fare would drop automatically to the next lower figure when the equalizing fund reached the maximum without action of Council, since it advanced automatically when the fund reached the minimum. John Thurston, president of the commission, contended that municipal ownership was of more consequence than low fares. Low fares might prevent the accumulation of a fund for the purchase of the property. Mr. Wright held that the people expect both low fares and municipal ownership. Mr. Wright's final suggestion was to make the fare low and then let the people decide by vote whether it shall be increased to provide a fund for the purchase of the property.

Henry L. Doherty presented a clause which provides for a sliding scale, with fares from the present fare down to five tickets for 15 cents. The commission asked that the minimum fare be made 2 cents and that 5 cents be made the maximum.

HOLYOKE ARBITRATION FINDING MADE PUBLIC

Brief reference was made in the ELECTRIC RAILWAY JOURNAL of Oct. 21, page 906, to the finding of the arbitration board sitting in the wages and working conditions case of the Holyoke (Mass.) Street Railway. The conclusions of the board were made public during the week ended Nov. 25, following the signing of the award by all three members. The union endeavored to obtain a day basis of payment for its members, but the board ordered compensation upon the basis of platform time, as desired by the company. Under the award the maximum pay of the platform men becomes 33 cents an hour. The finding extends from June 1, 1915, to Oct. 1, 1918, the wage scale in cents an hour being changed as of June 1, 1916, as tabulated below:

	June 1, 1915- June 1, 1916	June 1, 1916- Sept. 30, 1918
First six months	26	27
Second six months	28	28
Second year	29	29
Third year	30	31
Fourth year, etc.	32	33

In connection with the 1915-1916 scale above listed, each man of thirty crews who worked more than nine hours on schedule runs is to receive one-half hour's extra pay for each day so working, at the rates as determined above, allowing the men a cent in each case instead of a fractional part thereof.

The award allows each conductor, after June 1, 1916, five minutes at the close of his platform work each day for making up and turning in his cash returns, with compensation at his platform rate. Schedule runs are defined as those that provide daily not less than eight hours nor more than nine and one-half hours platform work inside of twelve consecutive hours. The company is to arrange its schedule runs so that not more than 20 per cent are to exceed nine hours' platform work performed within eleven consecutive hours; not more than 20 per cent are to exceed nine hours' platform work within twelve consecutive hours; not more than 30 per cent are to exceed nine and one-half hours' work in eleven and one-half hours, and not more than 30 per cent nine and one-half hours' work in twelve. Extra platform work may be performed daily within fourteen consecutive hours. Any scheduled run taking from eight hours to nine hours is to be paid as nine hours, but crews so paid are to hold themselves in readiness at the expiration of the day's schedule runs to perform reasonable service until the close of the nine hours. Such men are to be notified by the manager or superintendent at the close of their respective schedule runs of the day whether the company has further occupation for them.

Spare men are to have the preference for extra platform work, followed by employees operating schedule runs, and then by men not otherwise employed by the company whom the manager shall consider qualified to perform extra or other platform work. Spare men ordered to report, and who do report to cover sleepovers, are each to receive two hours' pay, provided they remain on the company's premises during that period. Carhouse men, shop employees and track greasers are to receive ten hours' pay for nine hours' work. Employees of carhouses and shops are to be allowed ten minutes' time before the noon hour for washing purposes. Intervening time is to be paid to all motormen and conductors operating scheduled runs who report on order for extra service within one hour after the completion of their scheduled run, such payment to be from the time of such completion until they take their cars into the house or are relieved; but in no case are such platform men to receive less than two hours' pay.

PLEA MADE FOR HYDRO-RADIALS

The central executive of the Ontario Hydro-Radial Railway Union interviewed the Cabinet of the Ontario government at the Parliament Buildings, Toronto, on Nov. 7, and made the following requests:

1. That the government provide money so that the Hydro-Commission may from time to time purchase radial rights-of-way for the municipalities of the province. That such sums be in the nature of loans to the municipalities until after the war, when the municipalities can raise the required sums on debentures and repay their obligations to the government.
2. That legislation be passed at the next session of the House placing the Chippawa Creek power development scheme in the hands of the Hydroelectric Power Commission, as representing the municipalities, and that the municipalities receive authority to vote on Jan. 1, 1917, on the question of guaranteeing the bonds of the commission jointly with the government's guarantee.
3. That the "ambiguous and uncalled for and unwarranted" sections of bill 167, which prevents municipalities building radials during the war, be eliminated and only the clause allowed to remain which gives the government power to authorize the purchase of rights-of-way.
4. That legislation be passed at the next session divorcing the hydro and its commission from any government department so as to make it absolutely independent and not liable to be referred to as being under the attorney-general's department.

After a very attentive hearing by the government to the deputation, careful consideration of the proposals was promised. The government also promised that the necessary orders-in-council providing money for the purchase of the rights-of-way would be passed as they were asked for by the votes of the municipalities. With regard to the Chippawa Creek development, it was pointed out that it would have to stand pending the determinations of the respective rights of the Province and the United States.

Voters along the route of the proposed electric railway between Toronto and St. Catharines, Ont., have been asked to express approval at the January municipal elections of various bond issues assessed against localities for the construction of the line. The Ontario Hydro-Electric Commission has agreed that no construction work shall start until after the war, but it is the purpose of the commission to have all financial details and construction surveys completed before that time. It is said that the commission desires to buy the Niagara, St. Catharines & Toronto Railway, between Niagara Falls, Ont., and St. Catharines, and use the line as the connecting link between Toronto, St. Catharines and the Niagara frontier. If these negotiations are unsuccessful the commission has completed a survey of a route 4 miles shorter which extends from Niagara Falls, Ont., to Port Colborne, along the Canadian shore of Lake Erie and through to Welland and St. Catharines. Cities and towns along the route are asked to meet any deficit that may result from the operation of the road. If the railway should prove a succcess the bonds will be paid from the earnings. The bonds are to run for fifty years.

NEW OFFICERS FOR NORTHERN OHIO TRACTION & LIGHT COMPANY

New officers have been elected for the Northern Ohio Traction & Light Company, Akron, Ohio, as follows: President, B. C. Cobb; vice-president, T. A. Kenney; vice-president, treasurer and general manager, A. C. Blinn; secretary, F. C. Potvin; assistant secretary and assistant treasurer, S. E. Wolff. The board of directors consists of B. C. Cobb, J. C. Weadock and T. A. Kenney, New York; Frank Silliman, Jr., Philadelphia; A. C. Blinn and Charles Currie, Akron; E. W. Moore, J. R. Nutt, T. H. Hogsett, J. P. Witt and J. P. Becker, Cleveland. Messrs. Cobb, Weadock, Kenney and Wolff are connected with Hodenpyl, Hardy & Company, New York, N. Y., while Mr. Blinn was formerly vice-president, treasurer and general manager of the Public Utilities Company, Evansville, Ind. Control of the Northern Ohio Traction & Light Company passed recently to Hodenpyl, Hardy & Company and E. W. Clark & Company.

CLEVELAND HAS A PAVING QUESTION

The Cleveland (Ohio) Railway has notified Fielder Sanders, street railway commissioner, that the cost of repaving between the tracks, where street improvements are being made, must be borne by the city. Mr. Sanders found that the ordinance making this requirement had been repealed during the administration of Peter Witt, and the same is true of the ordinance requiring the company to pay for the relocation of tracks, where public improvements are being made. Mr. Sanders contends, however, that the company did not attempt to place the charge for such work upon the city during Mr. Witt's time.

The Cleveland Railway was granted a franchise on Oct. 30 for an extension of its track to the new city hall on Lakeside Avenue, but it will probably not accept it, because of the fact that it requires the company to pay for paving between the tracks.

J. J. Stanley, president of the Cleveland Railway, recently notified the board of directors that the present car equipment was not sufficient to take care of the increased number of passengers without unpleasant crowding.

FRANCHISE DISCUSSED IN MONTREAL

The Montreal (Que.) Tramways is desirous of obtaining a further franchise from the city, and the president, counsel, and manager have recently met the comptrollers and publicly discussed the terms of the franchise with a view of finding a basis of agreement. The proposed clauses include those relating to poles, rails, repairs, maintenance, seating accommodation, etc. It was suggested that the wooden poles should be replaced by iron poles laid in cement, the cost of the wooden poles being $1,000 per mile while the iron poles would cost $6,000. The question of appointing experts to advise the city as to the physical valuation of the company's property and on other points before a further franchise was granted was debated. The names of E. L. Cousins, Toronto, and P. St. George, Montreal, were mentioned. The representatives of the company strongly opposed certain suggestions involving large expenditures, the president pointing out that if the comptrollers insisted on very onerous conditions the public would have to pay for them in the end. The question of fixing standards of service was also considered.

Service Abandoned in Cleburne.—The Cleburne (Tex.) Street Railway has discontinued service. Announcement is made that lack of patronage made it impossible to operate the lines at a profit. The company has been in receivership and the property has once been sold at public sale by order of the court. It is said that the rolling stock will be sold and the rails probably torn up.

Park Commissioner Opposes Central Electrification Plan.—The proposed contract between the City of New York and the New York Central Railroad involving changes in Riverside Park is discussed at length by Park Commissioner Ward in his annual report. Mr. Ward is dissatisfied with the proposed plan. He seems to fear that the Board of Estimate, at an early meeting, will adopt the plan, and it will then be too late for the modifications which he deems should be made.

Wilbur Sadler's Memory Honored.—The Board of Freeholders of Mercer County, N. J., will place a memorial lamp on the new Willow Street bridge at Trenton in honor of Adjt. Gen. Wilbur Fisk Sadler, electric railway promoter, who died recently at Carlisle, Pa. as noted in the ELECTRIC RAILWAY JOURNAL of Nov. 18. General Sadler took much interest in having a bridge erected and rendered valuable assistance to the freeholders. The State of New Jersey will also have a bronze tablet erected in memory of General Sadler because of his efforts in behalf of the State in the building of General Stacy Park in the rear of the State House at Trenton.

Railroad Club Elects Officers.—At the annual meeting of the New York Railroad Club on Nov. 17 these officers were elected: President, James Milliken, superintendent of motive power for the Philadelphia, Baltimore & Washington Railroad; First Vice-President, Sidney Chambers, superintendent of motive power of the Central Railroad of New

Jersey; Second Vice-President, C. L. Bardo, general manager of the New York, New Haven & Hartford Railroad; Third Vice-President, Miles Bronson, manager of the Grand Central Terminal; Treasurer, R. M. Dixon, president of the Safety Car Heating & Lighting Company, and Secretary, Harry D. Vought.

Cities Service Orders Power Equipment.—The Cities Service Company, New York, N. Y., has placed with the General Electric Company an order which calls for generating units for various electric generating and distributing subsidiaries of the Cities Service totaling 86,000 kw., or approximately 115,000 h.p. of generating capacity. The contract price is close to $1,000,000. In addition to this order the Cities Service Company also has placed with the Westinghouse Electric & Manufacturing Company orders for generating equipment totaling 41,000 kw., or approximately 58,000 h.p., at a contract price of about $500,000.

Final Hearing on Proposed Removal of Elevated Tracks.—The Public Service Commission for the First District of New York, on motion of Commissioner Travis H. Whitney, has fixed Dec. 4, 1916, as the date for a final hearing upon the question of the disposition to be made of the elevated tracks upon lower Fulton Street, Brooklyn. Upon the facts presented at the hearing, taken in connection with those brought out at previous hearings, together with studies made by Commissioner Whitney and other officials of the Public Service Commission, will be predicated the action of the commission in its final settlement of the much discussed Fulton Street situation.

Electric Railway Labor Leaders See President Wilson.—Four labor leaders affiliated with organizations of electric railway employees called at the White House on Nov. 27 by appointment and had an interview with President Wilson. None of them would make known the object of his visit, and from the White House no statement was forthcoming. It was reported from Washington that the purpose of the visit might be to ask President Wilson to use his influence to have employees of electric railways engaged in interstate commerce included in the provisions of the Adamson eight-hour law. Another theory was that the visit was in connection with the New York City local situation.

Two New Trustees for the Connecticut Company.—Morgan B. Brainard, vice-president and treasurer of the Aetna Life Insurance Company, and Charles C. Sanford, president of the First National Bank, Bridgeport, have been appointed by Federal Judge Mayer as members of the board of trustees of the Connecticut Company provided for in the decree entered against the New York, New Haven & Hartford Railroad in the Sherman act law suit. The appointments were made to fill vacancies caused by the deaths of George E. Hill and Lyman B. Brainard. Of the original board of trustees, named in April, 1914, only two members are living, Judge Walter C. Noyes, New London, and Charles Cheney, South Manchester. Those who died were William Waldo Hyde, George E. Hill and Lyman B. Brainard. In December, 1915, Leonard M. Daggett, New Haven, was appointed to the board to fill the vacancy caused by the death of Mr. Hyde and, with the appointment of Mr. Brainard and Mr. Sanford, the board is complete.

Cleveland's First Franchise Granted Fifty Years Ago.—On Oct. 25, 1859, fifty-seven years ago, the City Council of Cleveland, Ohio, granted its first street railway franchise to the Kinsman Street Railway. There were objections to the innovation from people who felt that a railway would interfere with other forms of traffic and transportation and others thought that a city of 40,000 people could not afford a luxury of that kind. Troubles and delays of one kind or another interfered with construction and the East Cleveland Street Railway had its line in operation first. Ground was broken for the latter in the summer of 1860, and in the fall of the same year cars were running between Bank Street, now West Ninth Street, and Wilson Street, now East Fifty-fifth Street. Fifteen years later the city had nine car-lines, owned by a number of companies. The East Cleveland Street Railway, however, kept ahead of others and at that time was operating thirty-seven cars with 246 horses, while the Kinsman Street Railway had three cars, six horses and 2 miles of track.

Financial and Corporate

THE FUTURE OF UTILITY INVESTMENTS

Non-Speculative Capital Will Flow Freely if Rate Regulation Provides for Security of Investment to Go With Lower Rate of Return

The expansion of public utilities and the enormous increase in public utility investments during the last twenty-five years have been among the most remarkable developments of this age. The important question to-day, however, is—how will the future affect this utility development and utility investments? To Delos F. Wilcox, writing in the November issue of *The Annals* of the American Academy of Political and Social Science, it seems reasonable to anticipate that the need of additional capital to be invested in the expansion of utility plants in this country will go on in the future much as it has in the past, say at the rate of $1,000,000,000 a year. In spite of this need, however, capital will for some time to come hesitate about going into public utilities in those communities where the chance of speculative profit is removed and no compensating security given. Ultimately, through the full triumph of the theory of public service, there will be a free flow of non-speculative capital into utilities to the extent that the consuming public is able and willing to pay for the expansion of the service.

Mr. Wilcox bases his prediction upon certain conclusions deduced from utility experience. In a growing community, he says, utility investments tend to lag behind the demand, and therefore when city growth slackens or stops, the demand for utility expansion continues until the community has spread out. Transfers of population, moreover, will not release existing utility investments but will necessitate large additional ones in new districts. In general, the relative importance of transportation and communication necessarily increases with the growing complexity of social organization. Furthermore, although utilities are primarily urban phenomena, they are the promoters or sales agents, to rural districts, of the economic and social advantages hitherto characteristic of urban life, and the territorial expansion of utility service means generally an even greater investment in proportion to the population served than the investment required for strictly urban service.

In the early days, Mr. Wilcox states, utilities were involved in a riot of speculation, but this was attacked first through taxation and then more directly through rate regulation. At present the public pressure for a reduction of rates is a continuing force tending toward the elimination of the speculative element in utility investments. At the same time this force, if not supplemented by measures calculated to give security to the investment, will drive capital into other fields. If security follows rate regulation, utility stocks and bonds will merely appeal to another class, the investors, who are willing to accept a lower return with security.

In Mr. Wilcox's opinion, there are some facts which the public must recognize, for security of utility investments and the assurance of a fair return thereon will necessitate the giving up of many long-cherished illusions on the part of the public. The fancied protection of maximum or absolute rates fixed by franchise contract for a long term of years must be surrendered. It must be frankly admitted that rate regulation involves the possibility of increase as well as decrease of rates, whenever justice demands it. Utilities must not be harassed by demands financially impossible, and if the standards of service are to be raised year by year, the people who receive the improved service will have to pay for it. Moreover, the public will have to reconcile itself to an allowance of adequate depreciation funds, and it must give up once for all its lingering fancy for competition in utility service. It will also have to forego the short-term franchise that imposes no obligation upon the city to protect the investment at the end of the franchise period. In short, Mr. Wilcox states, the "let-them-take-a-chance" policy must be definitely discarded.

ANNUAL REPORT

Virginia Railway & Power Company

The comparative statement of income, profit and loss of the Virginia Railway & Power Company, Richmond, Va., for the years ended June 30, 1915 and 1916, follows:

	1916		1915	
	Amount	Per Cent	Amount	Per Cent
Revenue from railway operations	$3,172,862	56.20	$2,838,370	55.55
Light, power and gas revenues	2,472,296	43.80	2,271,252	44.45
Total operating revenues	$5,645,158	100.00	$5,109,622	100.00
Railway operating expenses:				
Maintenance of way and structures	$251,424	7.92	$286,560	9.46
Maintenance of equipment	180,611	5.70	173,137	6.10
Traffic expenses	8,725	0.27	6,742	0.24
Transportation expenses	1,006,422	31.71	901,005	31.74
General expenses	342,205	10.79	293,157	10.33
Total	$1,789,387	56.39	$1,642,601	57.87
Light, power and gas expenses	886,792	35.87	826,473	36.39
Total operating expenses	$2,676,179	47.41	$2,469,074	48.32
Operating income	$2,968,979	52.59	$2,640,548	51.68
Other income	96,610	1.71	80,919	1.58
Gross income	$3,065,589	54.30	$2,721,467	53.26
Taxes and licenses	327,631	5.80	298,551	5.84
Income applicable to fixed charges and rentals	$2,737,958	48.50	$2,422,916	47.42
Fixed charges and rentals	1,415,036	25.05	1,337,867	26.19
Surplus over fixed charges and rentals	$1,322,922	23.44	$1,085,049	21.23
Depreciation	$100,000	1.77	$100,000	1.96
Proportion of discount on securities	30,316	0.54	29,261	0.57
Net miscellaneous charges not operating	38,488	0.68	33,284	0.65
Total direct charges	$168,804	2.99	$162,546	3.18
Surplus over fixed and other charges	$1,154,118	20.45	$922,503	18.05

The operations of the Richmond Railway & Viaduct Company for the last fiscal year are included in the above statement, but not for 1915. The gross income from all sources, after operating expenses, showed an increase of $344,122, or 12.65 per cent, and established the highest record of earnings in the history of the company. Railway operations secured increased revenue of $334,492, or 11.8 per cent, and the total light, power and gas revenues rose $201,044, or 8.8 per cent, so that the total operating revenue increased $535,536, or 10.4 per cent. The total operating expenses, however, increased $207,104, or 8.4 per cent, so that the operating income gained $328,431, or 12.4 per cent, This, combined with an increase of $15,691 or about 19 per cent in other income, gave the unprecedented gain in gross income before noted. The gain in surplus over fixed and other charges was $231,615, or about 25 per cent.

The stated increase in total operating expenses arose from an increase of $60,318, or 7.3 per cent, in light, power and gas expenses, and $146,786, or 8.9 per cent, in railway expenses. In the railway group, maintenance of way and structures alone showed a decrease. The total expenditures for railway maintenance amounted to $432,035, or 13.62 per cent of the railway revenues in 1916, as compared to $441,697, or 15.56 per cent, the previous year. In addition to the regular charge for maintenance of way and equipment, $100,000 was carried to the depreciation reserve, and an additional sum of $335,973 was credited thereto as of June 30, 1916. The balance in the reserve on this date was $1,157,866, as compared to $960,572 the preceding year.

The company expended $371,597 for additions, extensions and betterments in 1916. Various statistics follow:

	1916	1915	Change
Revenue passengers carried	67,226,456	62,271,603	+4,954,853
Transfer and free passengers	16,980,726	14,706,115	+2,274,611
Total passengers carried	84,207,182	76,977,718	+7,229,464
Percentage of passengers using transfers	19.33	18.10	+1.23
Average fare per passenger, including transfers	$0.037	$0.037	......
Car mileage	13,750,325	12,439,758	+1,310,567
Car hours	1,645,521	1,513,612	+131,909
Total revenue per car mile	$0.231	$0.228	+$0.003
Total revenue per car hour	$1.928	$1.87	+$0.058
Operating expenses per car mile	$0.131	$0.132	—$0.001
Operating expenses per car hour.	$1.088	$1.09	—$0.002

ELECTRIC RAILWAY STATISTICS

Returns for Year Ended June 30, 1916, Are Encouraging for East and South, with Depression in West

A comparison of electric railway statistics for the twelve months ended June 30, 1916, with figures for the corresponding period of 1915, made by the information bureau of the American Electric Railway Association, indicate an encouraging improvement in the electric railway business of the Eastern and Southern districts of the United States, together with a continued depression in the Western district. This latter is probably due both to the economic effects of the European war and to unregulated jitney competition. Increasing expenses and taxes accompany the advance in net earnings and net income. Data for twelve months representing 8721 miles of line* of companies scattered throughout the country indicate an increase in operating revenues of 3.47 per cent, in operating expenses of 2.40 per cent and in net earnings of 5.15 per cent, while data representing 7718 miles of line indicate an increase in taxes of 3.04 per cent, and in net income of 25.72 per cent. The operating ratio of the United States as a whole decreased from 61.19 per cent in 1915 to 60.56 per cent in 1916, though that of the Western district increased from 63.01 per cent in 1915 to 64.18 per cent in 1916. Moreover, the operating ratio of this district was higher than that of the other two groups.

The number of revenue passengers carried by companies representing 6667 miles of line increased 4.13 per cent, while the number of transfer passengers increased 2.90 per cent, the revenue car mileage 2.42 per cent and revenue car hours 0.43 per cent. Indications point to almost no increase in traffic in the Western district while its earnings decreased. The average fare per revenue passenger decreased 0.39 per cent while the average fare per passenger, including transfers, decreased 0.25 per cent. It must be borne in mind in this connection that both of these figures are based upon the combined returns of both city and interurban electric railways. The average number of revenue passengers per passenger car-mile increased 1.64 per cent.

The returns from the city and interurban electric railway companies, as shown in the tables on the following page, were classified according to the following geographical grouping: *Eastern District*†—East of the Mississippi River and north of the Ohio River. *Southern District*—South of the Ohio River and east of the Mississippi River. *Western District*—West of the Mississippi River.

Table I shows the revenues, expenses and net earnings of 185 electric railways in the United States as well as the net income of 150 companies reporting taxes and fixed charges. Of the three groups in this table, the Western represented by 2262 miles of line showed a decrease in operating revenues of 1.04 per cent and a slight increase in operating expenses, while net earnings decreased 4.19 per cent. The net income of companies in this group represented by 1966 miles of line decreased 14.91 per cent. The Southern and Eastern groups secured increases in operating revenues, expenses and net earnings. The net income of the Southern group increased about 25 per cent, while that of the Eastern apparently increased over 50 per cent. All groups had an increase in the amount of taxes paid, the percentage increase for the United States as a whole being 3.04.

Table II shows the details of the operating revenues of companies represented by 6926 miles of line. This table shows a considerable decrease in the mail revenue together with increases in freight, express and milk revenue. As a whole passenger revenue increased, though that of the Western group decreased. The largest increase in passenger revenue, one of 5.71 per cent, occurred in the Eastern group.

Table III gives the traffic statistics of companies represented by 6667 miles of line. All groups secured increases in the number of passengers carried and car-miles run. The Eastern and Southern showed increases in the number of car-hours run, while the Western suffered a very slight decrease of 0.07 per cent. The Southern district showed the greatest increase in the number of transfer passengers carried; the Western, the least. The per cent of increase in the number of revenue passengers carried was almost the same in the Eastern and Southern groups, while the Western district showed almost no increase. A large number of companies keep no record of free passengers, and the records of free passengers as shown in the table are therefore somewhat smaller than the actual figures. The average fare per revenue passenger decreased in all but the Southern district, where there was apparently a slight increase. A similar decrease occurred in the average fare per passenger including transfers, though the Southern district showed no change in this respect. The average number of revenue passengers per passenger car-mile increased in the East and decreased in the South and West, particularly in the latter district. The increase for the United States as a whole was one of 1.64 per cent.

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*The 1912 report of the Bureau of the Census on street and electric railways gives the total miles of line in the United States as 30,437 miles.

†The returns for this group include the First and Second Districts of New York, exclusive of the Interborough Rapid Transit Company of New York City.

In Table IV are shown the revenues, expenses and net earnings per revenue car-mile and per revenue car-hour, together with the per cent increase or decrease over the corresponding figures for 1915. There are also given the number of revenue car-miles and revenue car-hours involved with the last three figures omitted. The table indi-

TABLE I

REVENUES AND EXPENSES OF ELECTRIC RAILWAYS FOR TWELVE MONTHS ENDING JUNE 30, 1916
COMPILED FROM MONTHLY RETURNS OF ELECTRIC RAILWAYS TO THE AMERICAN ELECTRIC RAILWAY ASSOCIATION

Account	United States		Eastern District		Southern District		Western District	
	Amount, 1916 (in thousands)	Increase over 1915, per cent	Amount, 1916 (in thousands)	Increase over 1915, per cent	Amount, 1916 (in thousands)	Increase over 1915, per cent	Amount, 1916 (in thousands)	Increase over 1915, per cent
Operating revenues	208,641	3.47	141,650	5.18	13,947	4.27	53,044	*1.04*
Transportation revenues	202,822	3.54	137,472	5.37	13,425	4.12	51,931	*1.14*
Other railway operating revenues	5,813	0.87	4,178	*0.78*	522	8.30	1,113	4.02
Operating expenses	126,352	2.40	84,396	3.25	7,911	0.36	34,045	0.81
Way and structures	18,758	2.89	13,682	[illegible]	1,018	*4.41*	4,058	*6.96*
Equipment	15,488	1.56	10,912	3.20	782	1.69	3,794	*2.89*
Traffic	637	6.17	344	7.77	[illegible]	3.92	240	36.36
Conducting transportation	73,000	2.66	47,929	2.54	4,758	0.42	20,313	3.48
Power	19,690	2.70	12,663	0.18	987	*0.60*	6,040	[illegible]
Car operation (including supervision)	53,310	2.64	35,266	3.41	3,771	0.72	14,273	1.29
General and miscellaneous	18,469	1.46	11,529	2.53	1,300	3.17	5,640	*1.02*
Net earnings	[illegible]	5.15	57,254	8.15	6,036	[illegible]	[illegible]	*4.19*
Operating ratio, per cent. 1916	[illegible]	......	59.58	.....	56.72	......	64.18	......
Operating ratio, per cent. 1915	61.19	......	60.69	.....	58.93	......	63.01	......
Average number of miles of line represented	8,721	......	5,430	.....	1,029	......	2,262	......

COMPANIES REPORTING TAXES AND FIXED CHARGES

Account	United States		Eastern District		Southern District		Western District	
	Amount, 1916 (in thousands)	Increase over 1915, per cent	Amount, 1916 (in thousands)	Increase over 1915, per cent	Amount, 1916 (in thousands)	Increase over 1915, per cent	Amount, 1916 (in thousands)	Increase over 1915, per cent
Operating revenues	195,491	3.58	140,073	5.20	7,169	1.20	48,249	*0.54*
Operating expenses	118,182	2.21	83,371	3.26	3,866	*5.86*	30,945	0.55
Net earnings	77,309	5.73	56,702	8.20	3,303	10.91	17,304	*2.43*
Taxes	12,687	3.04	8,574	2.44	583	12.55	3,530	3.07
Operating income	64,622	[illegible]	48,128	[illegible]	2,720	10.57	13,774	*3.76*
Miscellaneous income	7,831	*0.55*	4,677	*2.48*	607	16.51	2,547	*0.39*
Gross income	72,453	5.50	52,805	8.14	3,327	11.61	16,321	*3.24*
Income deductions	57,045	1.10	43,053	[illegible]	1,813	1.91	12,179	1.50
Interest	39,887	0.45	26,824	*0.08*	1,468	3.67	11,595	1.15
Rentals and other	17,158	2.64	16,229	2.60	[illegible]	*4.96*	584	[illegible]
Net income	15,408	25.72	9,752	57.67	1,514	[illegible]	4,142	*14.91*
Operating ratio, per cent. 1916	[illegible]	......	[illegible]	......	[illegible]	......	64.14	......
Operating ratio, per cent. 1915	[illegible]	......	60.64	......	57.96	......	[illegible]	......
Average number of miles of line represented	7,718	......	5,181	......	571	......	1,966	......

TABLE II

DETAILS OF OPERATING REVENUES OF ELECTRIC RAILWAYS FOR THE YEAR ENDING JUNE 30, 1916

Account	United States		Eastern District		Southern District		Western District	
	Amount, 1916 (in dollars)	Increase over 1915, per cent	Amount, 1916 (in dollars)	Increase over 1915, per cent	Amount, 1916 (in dollars)	Increase over 1915, per cent	Amount, 1916 (in dollars)	Increase over 1915, per cent
Operating revenues	187,349,945	3.62	120,358,951	5.46	13,947,029	4.27	53,043,965	*0.48*
Transportation revenues	182,516,328	3.64	117,160,267	5.57	13,425,150	4.12	51,930,911	*0.59*
Passenger	178,918,815	3.68	114,922,053	5.71	13,110,931	4.17	50,885,831	*0.73*
Baggage	22,609	*5.59*	17,615	*1.58*	....	....	4,994	5.49
Special car, etc	180,907	2.70	83,418	8.87	12,066	8.18	85,423	*3.33*
Mail	140,742	*24.70*	[illegible]	*11.71*	7,412	1.45	49,644	*41.47*
Express	569,119	13.70	355,218	17.01	82,171	*7.81*	131,730	22.18
Milk	134,402	33.82	80,703	[illegible]	22,068	0.02	31,631	[illegible]
Freight	2,385,321	0.49	1,519,297	*3.06*	184,035	6.23	[illegible]	7.67
Switching	68,897	2.08	24,141	*8.60*	2,196	*22.95*	42,560	11.49
Miscellaneous	95,516	*25.81*	74,136	*30.16*	4,271	70.84	17,109	18.18
Other railway operating revenues	4,833,617	2.98	3,198,684	1.46	521,879	8.32	1,113,054	5.10
Station and car privileges	1,452,643	*1.79*	1,116,235	*3.12*	56,723	7.54	279,685	2.01
Parcel room	7,707	*3.67*	4,317	*1.89*	1,204	*3.53*	2,186	*7.10*
Storage	781	224.07	127	11.40	....	....	[illegible]	414.96
Car service	10,948	24.27	5,471	170.57	....	....	5,513	*19.13*
Rents, tracks and terminals	980,455	*4.94*	679,408	*8.08*	68,922	7.50	232,125	1.74
Rents, equipment	246,427	38.97	92,767	20.96	2,100	*12.75*	151,560	*84.57*
Rents, buildings, etc	341,592	8.30	257,355	3.98	18,798	*4.43*	65,439	[illegible]
Power	641,788	*0.17*	354,162	*3.54*	79,880	*4.85*	207,746	8.33
Miscellaneous	1,151,240	11.73	688,842	[illegible]	294,252	14.20	168,146	*19.60*
Average number of miles of line represented	6,926	....	3,635	.....	1,029	..	2,262	....

TABLE III

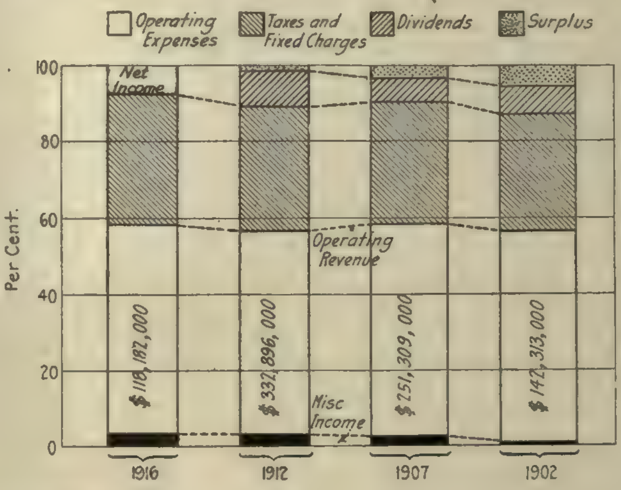
TRAFFIC STATISTICS OF ELECTRIC RAILWAYS FOR THE YEAR ENDING JUNE 30, 1916

Account	United States		Eastern District		Southern District		Western District	
	Amount, 1916 (in thousands)	Increase over 1915, per cent	Amount, 1916 (in thousands)	Increase over 1915, per cent	Amount, 1916 (in thousands)	Increase over 1915, per cent	Amount, 1916 (in thousands)	Increase over 1915, per cent
Car miles — total	631,862	2.46	387,184	2.04	45,360	5.59	199,318	2.59
Passenger car miles	619,006	2.45	379,821	2.15	44,541	5.69	194,644	2.31
Other revenue car miles	10,076	1.25	6,557	*5.93*	477	13.03	3,042	18.83
Non-revenue car miles	2,780	11.69	[illegible]	27.13	342	*13.42*	1,632	11.78
Car hours — total	68,998	0.45	42,551	0.24	5,258	4.33	21,189	*0.07*
Passenger car hours	68,106	0.42	42,143	0.35	5,161	4.64	20,802	*0.44*
Other revenue car hours	631	1.45	[illegible]	*7.50*	55	*1.79*	206	24.10
Non-revenue car hours	[illegible]	5.24	38	[illegible]	42	*19.25*	181	26.57
Passengers — total	4,507,701	3.82	2,884,785	5.39	244,942	5.98	1,377,974	0.32
Revenue passengers	3,457,028	4.13	2,262,859	5.85	[illegible]	5.41	993,543	0.17
Transfer passengers	1,019,672	2.90	609,258	3.81	39,944	8.76	370,470	0.56
Free passengers	31,001	0.96	12,668	2.32	4,372	9.08	13,961	*2.49*
Average fare per passenger								
Per revenue passenger	5.08c.	*0.39*	5.08c.	*0.20*	4.89c.	0.62	5.12c.	*0.97*
Per passenger (including transfers)	3.92c.	*0.26*	4.00c.	0.25	4.08c.	0.00	3.73c.	*1.00*
Average number of revenue passenger per passenger car mile	5.58	1.64	5.96	3.65	4.50	*0.44*	5.10	*2.11*
Average number of miles of line represented	6,667	..	3,635	......	770	......	2,262	

TABLE IV

OPERATING REVENUES AND EXPENSES OF ELECTRIC RAILWAYS PER REVENUE CAR MILE AND CAR HOUR
YEAR ENDING JUNE 30, 1916

Account	United States		Eastern District		Southern District		Western District	
	Amount, 1916 (in cents)	Increase over 1915, per cent	Amount, 1916 (in cents)	Increase over 1915, per cent	Amount, 1916 (in cents)	Increase over 1915, per cent	Amount, 1916 (in cents)	Increase over 1915, per cent
Per revenue car mile:								
Operating revenues	[illegible]	1.11	31.15	[illegible]	23.10	0.52	26.83	*3.49*
Operating expenses	17.53	*0.17*	18.16	0.89	13.45	*2.54*	17.22	*1.66*
Net earnings	11.69	[illegible]	12.99	7.09	9.65	5.12	9.61	*6.61*
Revenue car miles*	[illegible]	......	[illegible]	......	45,018	......	197,686	......
Average number of miles of line represented	6,667	......	3,635	......	770	......	2,262	.....
	(In dollars)		(In dollars)		(In dollars)		(In dollars)	
Per Revenue car hour.								
Operating revenues	2.67	[illegible]	2.83	5.20	1.99	1.53	2.52	*1.18*
Operating expenses	1.60	1.27	1.65	2.48	1.16	*1.69*	1.62	1.25
Net earnings	1.07	5.94	1.18	[illegible]	0.83	6.41	0.90	*5.26*
Revenue car hours*	68,737	.....	42,513	....	5,216	....	21,008	....
Average number of miles of line represented	6,667	.....	3,635	....	770	....	2,262	.....



Note—Figures in italics denote decreases. *Last three figures are omitted.

MISCELLANEOUS STATISTICS OF ELECTRIC RAILWAYS IN THE UNITED STATES FOR THE FISCAL YEAR ENDED JUNE 30, 1916, WITH INCREASES OVER THE PRECEDING YEAR cates that the net earnings per revenue car-mile increased 3.09 per cent, while the net earnings per revenue car-hour increased 5.94 per cent. The largest increase occurred in the Eastern group, while the Western suffered decreases of 5.26 and 6.61 per cent respectively.

The chart on page 1176 is a graphical representation of the income account of the electric railways of the United States for the four years 1902, 1907, 1912, 1916. The first three are based on the returns from the 1912 census of street electric railways and are taken from a diagram in F. W. Doolittle's "Studies in the Cost of Urban Transportation Service" (page 25). The figures for 1916 are based upon the returns of 150 electric railways represented by 7700 miles of line. Though of course not strictly comparable owing to the difference in the number of companies represented, they furnish some indication as to the trend of operating expenses and net income.

Cincinnati & Columbus Traction Company, Cincinnati, Ohio.—The property of the Cincinnati & Columbus Traction Company is advertised to be sold at Cincinanti on Dec. 19, under foreclosure of the first mortgage of $600,000 and the second mortgage securing $148,000 of notes outstanding. The upset price of the property free and clear of all liens has been set at $850,000.

Illinois Traction Company, Peoria, Ill.—Bodell & Company, Providence, R. I., are offering at 99½ and accrued dividend a block of 6 per cent cumulative guaranteed preferred stock of the Danville, Champaign & Decatur Railway & Light Company, which is under the management of the Illinois Traction Company. The present offering is a small additional amount to that previously outstanding and brings the amount of this issue outstanding up to $500,000.

Keystone Utilities Company, Hanover, Pa.—The Keystone Utilities Company was incorporated under the laws of Delaware on Nov. 27, with an authorized capital stock of $5,000,000, to take over a number of public utilities in Pennsylvania, among them the Hanover & McSherrystown Street Railway, the Hanover Light, Heat & Power Company, the Gettysburg Electric Company, the Du Bois Electric & Traction Company, and the Susquehanna County Light & Power Company. Among the directors are F. J. Platt, E. J. Lynett, James A. Linen, Jr., Griffith T. Davis and W. W. Inglis, Scranton; Irving A. Stearns and Guy W. Moore, Wilkes-Barre.

Pensacola (Fla.) Electric Company.—The Pensacola Electric Company has declared a dividend of 1½ per cent on the $300,000 of preferred stock of the company on account of accumulation, along with the semi-annual 3 per cent dividend, both payable on Dec. 1 to holders of record of Nov. 23. This leaves about 7½ per cent still in arrears.

Public Service Corporation of New Jersey, Newark, N. J.—The financial statement of the Public Service Commission of New Jersey for October shows a gross increase in total business over October, 1915, of $466,189, or 13.9 per cent. The balance available—after payment of operating expenses, fixed charges, sinking fund requirement, etc.—for amortization, dividends and surplus, was $641,066, and the increase in surplus available for dividends over the corresponding month in 1915 was $130,234. The gross increase in total business for the ten months ended Oct. 31, 1916, amounted to $4,096,443, or 13.4 per cent. The balance available for amortization, dividends and surplus totaled $4,568,381, and the increase in surplus was $1,018,738.

Springfield, Troy & Piqua Railway, Springfield, Ohio.—The Springfield, Troy & Piqua Railway has applied to the Ohio Public Utilities Commission for authority to issue $280,000 of common stock and $250,000 of bonds to reimburse the estate of Asa F. Bushnell on account of $670,844 of advances made to the company.

Toronto (Ont.) Railway.—William A. Read & Company, New York, N. Y., have sold $1,250,000 of 6 per cent gold notes of the Toronto Railway due $500,000 on Dec. 1, 1917, and $750,000 on Dec. 1, 1918. The notes are in coupon form of $1,000 each. They are redeemable at 102½ and interest on any interest date on thirty days' notice. The railway agrees not to issue any bonds or other funded debt while any of these notes remain unpaid, without applying the proceeds to their redemption. The present $1,250,000 of notes are part of an authorized issue limited to $2,000,000, of which $1,500,000 will eventually be issued to refund a like amount of a previous issue. Of this old issue, $1,250,000 was to mature on Dec. 1, 1916, and $250,000 on Dec. 1, 1917. The notes represent extensions and improvements of the Toronto Power Company, Ltd., which endorses them.

Third Avenue Railway, New York, N. Y.—The Third Avenue Railway, on Nov. 28, passed the quarterly dividend. Dividends were renewed last January for the first time since 1911, at the rate of 1 per cent a quarter, and 3 per cent has been disbursed this year. F. W. Whitridge, president of the company, said: "The statement for four months shows that there was a decrease of $1,433,921 in the operating revenue and a decrease of $1,282,154 in the net income. This latter sum may be estimated to be the net cost of the strike on the Third Avenue Railway during the last four months. That performance is practically over. The service on all the lines under the jurisdiction of the Third Avenue Railway is now normal except in the town of Yonkers, where it is between 50 and 60 per cent normal." The October statement of the company showed that total revenue of $390,022 was $578,626 less than in the same month last year. There was a deficit of $505,508 after all deductions had been made.

United Light & Railways Company, Grand Rapids, Mich.—The United Light & Railways Company has executed an agreement with the New York Trust Company to secure an issue of convertible debenture bonds, due Nov. 1, 1956. One and a half million dollars will be issued presently.

DIVIDENDS DECLARED

Baton Rouge (La.) Electric Company, 3 per cent, preferred.

Eastern Power & Light Corporation, New York, N. Y., quarterly, 1¾ per cent, preferred.

Louisville (Ky.) Traction Company, quarterly, 1 per cent, common.

Northern Ohio Traction & Light Company, Akron, Ohio, quarterly, 1¼ per cent, common.

Rochester Railway & Light Company, Rochester, N. Y., quarterly, 1¼ per cent, preferred.

Washington Railway & Electric Company, Washington, D. C., quarterly, 1¼ per cent, preferred; quarterly, 1¾ per cent, common.

Wisconsin-Minnesota Light & Power Company, Eau Claire, Wis., quarterly, 1¾ per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

CITIES SERVICE COMPANY, NEW YORK, N. Y.

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Oct., '16	$1,122,910	$20,041	$1,102,869	$393	$1,102,476
1 " " '15	411,504	14,323	397,181	40,833	356,348
12 " " '16	8,233,952	232,384	8,001,568	340,069	7,661,499
12 " " '15	4,232,914	163,503	4,069,411	490,000	3,579,411

HUDSON & MANHATTAN RAILROAD, NEW YORK, N. Y.

1m., Oct., '16	$513,465	*$230,840	$282,625	$215,691	$66,934
1 " " '15	477,723	*192,605	285,118	212,502	72,616
4 " " '16	1,884,103	*860,077	1,024,026	859,430	164,596
4 " " '15	1,768,622	*759,418	1,009,204	847,035	162,169

PADUCAH TRACTION & LIGHT COMPANY, PADUCAH KY.

1m., Sept., '16	$26,019	*$17,033	$8,986	$7,128	$1,858
1 " " '15	23,864	*14,131	9,733	7,475	2,258
12 " " '16	309,432	201,118	108,314	87,345	20,969
12 " " '15	290,264	*181,222	109,042	91,654	17,388

PENSACOLA (FLA.) ELECTRIC COMPANY

1m., Sept., '16	$23,920	*$12,997	$10,923	$7,712	$3,211
1 " " '15	22,012	*12,186	9,826	7,062	2,764
12 " " '16	280,503	*155,104	125,399	90,585	34,814
12 " " '15	246,988	*146,777	100,211	86,639	13,572

PHILADELPHIA & WESTERN RAILWAY, UPPER DARBY, PA.

1m., Oct., '16	$47,433	$20,865	$26,568	$12,570	$13,998
1 " " '15	44,922	21,302	23,620	12,485	11,135
12 " " '16	508,235	242,346	265,889	150,501	115,388
12 " " '15	449,346	217,636	231,710	147,448	84,262

TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS, MINN.

1m., Oct., '16	$846,915	$512,896	$334,019	$141,883	$192,136
1 " " '15	807,582	488,731	318,851	144,173	174,678
10 " " '16	8,441,904	5,205,673	3,236,231	1,434,878	1,801,353
10 " " '15	7,822,440	5,020,124	2,802,316	1,416,420	1,385,896

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*Includes taxes.

Traffic and Transportation

BATHING BEACH A REVENUE BUILDER

Sunday Beach Travel in Summer Averages 30,000 on Portland Interurban Line that Carried Less than 5000 Before Resort Opened

About the middle of the summer season in 1915 it became apparent to the Portland Railway, Light & Power Company, Portland, Ore., that as a whole the people of Portland preferred above all other places of resort and recreation during the summer season those which afforded bathing facilities. It did not seem to matter particularly whether there were additional amusements. This led to a study of the possibility of developing some resort on the traction company's system which would offer bathing attractions.

On the Columbia River about 7 miles north of the heart of the city the railway, in conjunction with a number of other owners, held title to property on Sand Island, known as Columbia Beach. The Vancouver interurban line of the railway passes within a few hundred yards of the beach at a point which is an even thirty-minute run from the city. The island has a frontage of 5800 ft. on the river, the water is clean, the average current is from 2 to 3 m.p.h. in the summer, and the beach is of fine white sand with a gradual slope, making it an ideal beach for children and beginners.

Although there is a fine grove of trees on the island and attractive places for picnicking and camping, the place was practically unknown as a resort, and had never brought the owners any revenue.

In the middle of August, 1915, in its company publication which is distributed on the street cars, the railway company printed a paragraph about the possibilities of Columbia Beach. This was followed with an expenditure of $80 for display advertising in the daily papers in which the beach was mentioned as "an ideal romping place for the kiddies." The results of this publicity was a flood of applications for leasing the beach for the 1916 season, leases being requested on short and long terms and for almost every conceivable amusement and concession privilege. As a result, a concessionaire's agreement was drawn up whereby the lessee agreed to expend several thousand dollars for improvements, such as bath-houses, water supply and sewerage systems, athletic field, etc. This agreement netted a considerable revenue to the owners and the only expenditure on the part of the railway was the cost of the display advertising and construction of a station and loading platform.

When these arrangements were completed it was too late to accomplish much in 1915, but the lessees undertook an active advertising campaign in which the company assisted, and the beach came to be generally known.

The Vancouver line which serves the beach handles the regular through business to Vancouver, Wash., and there were no elements tending to increase the revenues on the line except the development of Columbia Beach. In 1916, the receipts on this line were about 230 per cent more than in 1915, and 550 per cent more than prior to the development of the bathing beach idea. The passenger totals for four Sundays in August, 1914, were 18,383, while the totals for four Sundays in August, 1915, were 35,769, and similar totals for four Sundays in August, 1916, were 119,314.

In the summer of 1916, the unprecedented high waters in the river and the late rains made it impossible to open the season at the beach until the first Sunday in August. Another condition which worked against the greatest returns to the railway was the construction of a 700-ft. causeway which enabled automobiles to reach the beach. In 1915, the only access to the beach was by electric car or boat, but with the completion of a highway bridge in 1916 the number of automobiles entering the grounds on Sundays ranged from 500 to 2000 and checks made by the railway showed the average number of passengers per automobile to be 4.8. The remarkable gain in receipts despite the auto competition indicates the efficacy of the advertising campaign and the popular approval which met the beach idea.

STATISTICS OF ACCIDENTS IN PENNSYLVANIA

John P. Doheny, chief of the bureau of accidents of the Pennsylvania Public Service Commission, on Nov. 25 submitted to William D. B. Ainey, chairman of the commission at Harrisburg, Pa., statistics relating to accidents that have occurred on steam railroads and street railways in Pennsylvania during the year ended June 30, 1916.

The total number of accidents during this period was 13,278, an increase of 9 per cent over the previous year so far as steam roads are concerned, and of 10 per cent with respect to the operation of electric railways. As a result of these accidents 1138 persons were killed on the railroads and 10,419 injured, while 174 were killed on the street railways and 2858 injured. There is an increase of 14 per cent with regard to railroad facilities and of 16 per cent with regard to the number injured. The increase in the number of killed on the street railways was 7 per cent, and in the number of injured 3 per cent.

The report shows that the trespasser is the chief sufferer from railway accidents, for although there is a decrease in the number of trespassers killed this class represents 50 per cent of the total number of railroad fatalities and only 1 per cent involves passengers.

Grade-crossing accidents on street railways other than city street crossings resulted in the death of eighteen people, fifteen of them automobilists, two pedestrians, and one by collisions with trains.

Thirty-nine people were injured in grade-crossing accidents, one an employee, twenty-three passengers, and fifteen others. The total number of killed and injured was fifty-seven.

CLEVELAND SERVICE TO BE INCREASED

Yielding to persistent demands from the public and the newspapers, Fielder Sanders, street railway commissioner of Cleveland, Ohio, has arranged a schedule for Superior Avenue that will add fourteen cars during the rush hours, and has promised to increase the number on Euclid and Detroit Avenues as soon as his checkers have finished their work.

The demand for additional cars has been earnest and vehement for some weeks past. It has been stated that as many as 200 and 250 cars have been found in the car storage yards during the rush in the morning and evening, while people were fighting for standing room in order to get back and forth.

Under the Cleveland settlement grant the operation of cars is in the hands of the company, but it must be conducted according to instructions from the city. J. J. Stanley, president of the Cleveland Railway, insists that the base tables should be raised, so that more cars may be run all through the day. Aside from the need of additional cars through the day, he says it will be impossible to secure men for the short hours morning and evening. All men receive pay for five hours any way, and he believes that the service should be better all around. The officers of the local branch of the Amalgamated Association agree with him in this.

Mr. Sanders said that it was very difficult to secure men and he did not know whether a sufficient number to operate the additional cars he has put on Superior Avenue can be obtained. The demand for men in other work is so great and the wages so high that men will not take places on the cars at the wages the company can afford to pay.

FARE INCREASE IN PENNSYLVANIA

The Titusville (Pa.) Traction Company has succeeded in securing an increase in fares from 5 cents to 6 cents in the city of Titusville, in the boroughs of Pleasantville and Hydetown and in the township of Oil Creek. Some few weeks ago the company in its campaign for permission to charge an adequate fare addressed the Mayor and the Commissioners of the city of Titusville summarizing the facts in connection with the affairs of the company that made an advance in rates imperative. In its statement to the Mayor and the Commissioners the company, through William J. Smith, its general manager, said that the road had not earned sufficient to pay interest at 5 per cent on its first mortgage bonds, to say nothing of the interest on the second mortgage bonds. Mr. Smith stated that this condition had been brought about in the last seven years by the great number of automobiles publicly and privately owned, together with the high cost of labor and materials which entered into the financial operation of the road. He offered to submit the records and books of the company to the Commissioners for verification of the facts set forth by him. Mr Smith said that the day had passed when the company could secure capital to meet its obligations year by year if it was unable to do so through its own resources.

The statement by Mr. Smith to the Mayor and the Commissioners was published in the papers in the territory through which the company operates. In a subsequent notice to the public published in the papers the company quoted in full the editorial, "Encouraging Fare Increases," which appeared in the ELECTRIC RAILWAY JOURNAL of Oct. 28. It also referred to other articles in the same issue of this paper relating to fare matters, notably the application of the Bucks County Interurban Railway, Trenton, for permission to increase its fares, the decision of the New Hampshire Commission in the Manchester & Derry Street Railway fare case and the allowance of the 6-cent fare rate for the major portion of the lines of the Massachusetts Northeastern Street Railway.

PITTSBURGH NIGHT FARE CASE ARGUED

The question of 10-cent fares at night on the lines of the Pittsburgh (Pa.) Railways was argued before the Superior Court at Philadelphia, Pa., recently. David A. Reed, attorney for the company, asserted that the Public Service Commission had wilfully ignored its own tariff statement in ruling that the railway had violated the publicity provision of the law when it restored the 10-cent night fare last summer. Mr. Reed explained that in 1907 the Pittsburgh Railways reduced its night fare to 5 cents in obedience to an act of the Legislature. Subsequently the act was declared unconstitutional. The railway, however, continued the 5-cent rate until the recent strike. With the aid of the Mayor the strike was settled, but the company was called upon to meet an additional expense of $500,000 a year. This made it necessary to find additional revenue, and it was decided to restore the 10-cent owl fare. The proposed new tariff was published and posted and notice was served on the Public Service Commission. In referring to the complainants' grounds of attack, Mr. Reed said the tariff was properly posted. C. Elmer Bown, representing William Jacoby, city complainant, contended that the company did not do what the law required in making the rate nor did it do anything that would give the public adequate notice that it proposed to put the increase into effect.

The decision of the commission in the case was referred to at length in the ELECTRIC RAILWAY JOURNAL of Oct. 14, page 856. The commission held that the company acted in violation of both the spirit and the letter of the Public Service Company Law of Pennsylvania in the way in which it proceeded to give notice of the doubling of the fare. No opinion was expressed of the commission with regard to the authorization of an increase in rates. It said that "when that matter comes before us in the regular way, and after full hearing shall be had, this commission will decide."

One-Man Cars in Fort Worth.—The Northern Texas Traction Company has put ten front-entrance one-man cars in service on the Summit Avenue line in Fort Worth. According to G. H. Clifford, general manager, the one-man cars are being tried as an experiment.

Accident on New York Elevated.—Eleven persons were injured on the morning of Nov. 24 by the derailment of the rear car of a southbound Third Avenue elevated train of the Interborough Rapid Transit Company at 129th Street, New York. After the car had left the rails it was dragged about 20 ft.

Withdrawal of Reduced Rate Tickets Suspended. — The Public Service Commission of Massachusetts has issued an order requiring the Bay State Street Railway to suspend until Jan. 1, 1917, unless otherwise directed, its proposed withdrawal from sale of strips of six tickets for 25 cents in the city of Fall River.

Near-Side Stops in Jeffersonville and New Albany.—The city cars of the Louisville & Southern Indiana Traction Company are being stopped on the near side in Jeffersonville and New Albany, Ind. The commercial organizations of the two cities requested the change, as the cars in Louisville and in other cities stop on the near side.

Journal Cartoon Reproduced in Birmingham.—The *Buzzer*, published in the interest of the employees of the Birmingham Railway, Light & Power Company, Birmingham, Ala., reproduced in its issue of Nov. 25 the editorial "Every Employee a Publicity Representative" and the accompanying cartoon, from the ELECTRIC RAILWAY JOURNAL of Nov. 4.

Prizes Offered for Car Names.—The Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., will offer cash prizes for the best name submitted and adopted for two new limited cars which have lately been installed. The new cars will operate between Fort Wayne, Ind., and Lafayette, Ind., the running time being four hours for the 110 miles.

New Destination Ordinance in St. Louis.—A bill has been passed by the Board of Aldermen of St. Louis, Mo., which provides that extra cars used at times when traffic is heavy, must display placards informing passengers just how far the car is going. By the provisions of the bill the United Railways is prohibited from running cars over any other than their regular routes except when emergencies arise.

Louisville Semaphores Successful.—In the annual report of the Board of Public Safety of Louisville, Ky., special attention is paid to the success which has attended the use of the semaphores installed as a part of the police department's traffic regulation at the principal corners. It is observed that pedestrians are coming more and more to be governed in their crossing at these intersections by the semaphore signals of the traffic officer.

Additional Time to Rebuild Running Boards.—A supplemental order has been issued by the Public Utilities Commission of Connecticut which makes it compulsory on the Shore Line Electric Railway to equip on or before June 1, 1917, all its double truck open cars with double running boards. The order permits the company to reconstruct cars that are not now so equipped, but on the understanding that the plans of reconstruction are first approved by the commission.

Portland Company to Test Rebuilt One-Man Car.—The Portland Railway, Light & Power Company, Portland, Ore., is rebuilding one of its three-compartment cars so that it can be operated by one man. The company has a number of these cars, weighing 13 tons, and equipped with two 27-hp. motors. The one being rebuilt will be operated as an experiment to see whether it will afford quicker service and whether it would be desirable to remodel other cars of this type in a similar manner.

Near Side Stops for Houston.—By agreement between the Public Service Commissioner of Houston, Tex., and the officials of the Houston Electric Company, near-side stops have been put into force on all street railway and interurban lines operating in the city. The near-side stop has been the order for down-town streets for several months and has proved satisfactory. It now has been extended to all residential streets. Certain leniency will be extended on unpaved streets, especially in wet weather, when the motorman may be permitted to use his own discretion.

Statement of Accidents Posted Monthly.—Every month hereafter there will be posted in each division of the United Railroads, San Francisco, Cal., a classified statement of all accidents. During the month of July last the number of car-miles per accident was 3955, and the number of passengers carried per accident was 32,546. In both August and September these figures each decreased, showing that, relatively, the number of accidents was greater in these months. The actual comparison of September with July showed that there was a decrease of 995 car-miles per accident and 5987 passengers per accident.

Conference on Louisville-Indianapolis Rates.—Action in regard to division of the rates for freight traffic north from Louisville over the Louisville & Southern Indiana and connecting lines to Indianapolis and beyond is understood to have been considered at a conference in Louisville between representatives of the Louisville Board of Trade and the railway managements. Chester P. Wilson, president, and Frank Smith, vice-president, of the Interstate Public Service Corporation, represented the railways, and John Telford, secretary of the transportation committee, represented the Board of Trade. Through routes and through rates were ordered by the Interstate Commerce Commission nearly three years ago, but no agreement has been reached as to division of the rates.

Service Abandoned in Lincoln.—The Lincoln Railway & Heating Company, Lincoln, Ill., has suspended business after a long period of unsettled relations with the city. About three months ago, the Public Utilities Commission of Illinois decided that the company could quit business if the city of Lincoln would concur therein. This permission was not received by the company, but after a number of weeks of uncertainty J. R. Patton, president of the company, issued an order discontinuing railway service. The Lincoln Railway & Heating Company was organized in 1891 and the first cars were run Christmas Day of that year. Mr. Patton bid in the property two years ago at foreclosure. It is expected that the lines will now be dismantled. The road is 5.5 miles long and equipped with seven motor cars. The decision to abandon the road is said to have been hastened by the prohibitive prices for coal and by the need which existed for immediate repair to the plant and equipment.

Thirty Extra Cars in Portland After Enforcement of Jitney Ordinance.—In the ELECTRIC RAILWAY JOURNAL for Nov. 25, page 1130, mention was made of the arrest of drivers of jitneys in Portland, Ore., charged with failing to secure franchises to operate as prescribed in an ordinance which went into effect on Nov. 15. In rendering decision in the case of one of the drivers arrested Judge Langguth sustained the right of the city to enforce the franchise requirement and sentenced the driver to pay a fine of $25. Attorney for the defense immediately gave notice of appeal. Meantime the jitneys, equipped with the speed and time recording devices required by the city ordinance for taxicabs, continued operating on the usual routes. On Nov. 20 A. J. Lee was arrested and made the defendant in a test case which will determine whether the jitney-taxicabs are infringements of the franchise ordinance. On Nov. 16 the Portland Railway, Light & Power Company added thirty cars to its regular service to handle the traffic which was not provided by the jitneys. Although no definite check of the additional traffic has been made, Fred Cooper, superintendent of transportation, estimated that the daily average jitney patronage was about 20,000. The railway company, it was announced, would put on such additional cars as were required to accommodate increases in the traffic.

Kansas City Suburban Fares to Be Considered.—The Kansas City (Mo.) Railways has asked the Public Service Commission of Missouri to inquire into the question of suburban rates on its lines extending beyond the city limits of Kansas City, Mo. The request of the company was a result of many complaints as to suburban rates, and specifically of the complaint filed with the commission on the rate to Maywood, a suburb about 15 miles from the center of Kansas City, Mo. At one hearing, Judge Kennish, chairman of the commission, intimated that without passing on the merits of the Maywood rate, the commission would be inclined to grant a reduction to a 5-cent fare, because the company already allowed a fare of only 5 cents to Fairmount Park, about equally distant from the city. The final hearing on the Maywood case was to have been held in Kansas City on Oct. 27. At that time the company intimated its purpose of filing the request for a general review. Temporarily, the Kansas City Railways is not charging the 10-cent fare heretofore charged for Maywood. It is, however, preserving its position, by not charging anything for the ride between Maywood and Kansas City, on business on which a city fare is collected. The fare from Kansas City to the city limits is 5 cents, and no additional fare is collected until after Maywood is passed. Inbound, conductors do not collect from passengers boarding cars at Maywood until after the city limits are reached, when the city fare is collected.

Personal Mention

R. W. Harris has been retained to make a survey of the Kansas City (Mo.) Railways with reference to the relation of schedules and cost of service on the various divisions.

A. C. Blinn, vice-president, treasurer and general manager of the Public Utilities Company, Evansville, Ind., has been elected vice-president, treasurer and general manager of the Northern Ohio Traction & Light Company, Akron, Ohio.

Charles Currie has been succeeded as vice-president and general manager of the Northern Ohio Traction & Light Company, Akron, Ohio, by A. C. Blinn, as noted elsewhere in this column. Mr. Currie has been general manager of the property for sixteen years, and has been active in electric and street railway work for thirty-four years. Some time ago he indicated his wish to be relieved of the active management of the Northern Ohio properties. He will continue with the company actively until Jan. 1, while Mr. Blinn is becoming familiar with the property. Mr. Currie has been re-elected a director, and, in addition, will serve the company hereafter in an advisory capacity.

Luke C. Bradley has been appointed district manager of the Stone & Webster properties in Texas. Mr. Bradley succeeds M. M. Phinney, who has been elected vice-president of the Stone & Webster interests with headquarters in Boston. Mr. Bradley has been in Texas for the last six years. His services with Stone & Webster cover a period of about fifteen years. For the last twenty years he has been engaged in public utility work, having occupied responsible positions of an engineering and operative character with various public utility corporations throughout the United States. Mr. Bradley went to the gulf coast section of Texas nearly six years ago as vice-president of the Houston Electric Company, Galveston-Houston Electric Railway and Galveston Electric Company, and manager of the latter two companies. In these capacities he was a constructive factor in the development of the Galveston-Houston territory. Early in 1913 he was appointed assistant district manager of the Stone & Webster properties in Texas, relieving Mr. Phinney of a large part of his duties as district manager. For a while the office was maintained in Dallas, but on account of its more centralized location with respect to the Stone & Webster properties was moved to Houston. Mr. Bradley is president of the American Electric Railway Transportation & Traffic Association, to which office he was elected at the recent convention in Atlantic City.

OBITUARY

Karl L. Wilcoxon, for the last five months master mechanic of the Chicago, Lake Shore & South Bend Railway, Michigan City, Ind., in charge of the shops and motive power, died recently from injuries received when one of the locomotives of his own company ran him down while switching in the Michigan City yards. Karl Wilcoxon was a son of C. N. Wilcoxon, president and general manager of the company. He was born in Muncie, Ind., in 1879. After completing his education he entered railway work at the age of nineteen, in the shops of the Citizens Street Railway, Muncie, Ind. Later on he was employed in the shops of the Decatur Railway & Light Company, Decatur, Ill., as general electrician. In 1901 Mr. Wilcoxon took employment with the Western Ohio Railway, Lima, Ohio, his first work in the interurban field being as train dispatcher. He was subsequently made chief train dispatcher of the Western Ohio Railway, and later was promoted to the office of superintendent of the company. He left the Western Ohio Railway in 1907 to become superintendent of the Pittsburgh & Butler Railway, a single-phase road operating between Pittsburgh and Butler, Pa. He afterward engaged in general construction work, and spent about three years on the Pacific coast in railway work. For the last three years he had been connected with the Chicago, Lake Shore & South Bend Railway, first as signal inspector and for the last five months as master mechanic.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Denver & Ephrata Street Railway, Denver, Pa.—Governor Martin G. Brumbaugh has approved a charter for the Denver & Ephrata Street Railway, which proposes to construct a line between Denver and Ephrata, 4.7 miles. Capital stock, $130,000. H. S. Dissler, Denver, president. Incorporators: H. W. Marburger, R. S. Dornbach, J. Guy Eshelman, G. R. Zimmerman and H. S. Dissler.

***Keystone Utilities Company, Scranton, Pa.**—Incorporated under the laws of Delaware to take over a number of public utilities in Pennsylvania, among them the Hanover & McSherrystown Street Railway, the Hanover Light, Heat & Power Company, the Gettysburg Electric Company, the Du Bois Electric & Traction Company, and the Susquehanna County Light & Power Company. Authorized capital stock, $5,000,000. Among the directors are F. J. Platt, E. J. Lynett, James A. Linen, Jr., Griffith T. Davis and W W. Inglis of Scranton; Irving A. Stearns and Guy W. Moore of Wilkes-Barre.

FRANCHISES

Peoria Heights, Ill.—The village of Peoria Heights, a suburb of Peoria, has revoked the franchise of the Peoria Railway, which operates a car on Galena Road through the village. The trustees said the company had failed to provide a fifteen-minute schedule as stipulated in the franchise. The company was ordered to discontinue the operation of its cars on the night of Nov. 22 and to have its tracks removed by Dec. 1.

Paterson, N. J.—An ordinance has been passed by the Board of Public Works permitting the Public Service Railway to relocate its tracks on lower Broadway opposite Mulberry Street and also on Van Houten Street west of Furman Street.

Bowling Green, Ohio.—The Toledo, Fostoria & Findlay Railway has received a twenty-five year franchise from the Council to operate cars over Wooster and Meeker Streets, Bowling Green.

TRACK AND ROADWAY

Edmonton Radial Railway, Edmonton, Alta.—It is reported that acting city engineer A. W. Haddow and J. H. Moir, traffic manager of the Edmonton Radial Railway, are investigating the suggestion of forming a belt line in the center of the city. The matter will come before next year's city council. The estimated cost of the line is $40,000.

Visalia Electric Railroad, Exeter, Cal.—Freight service has been begun by this company on its El Mirador extension.

Municipal Railways of San Francisco, San Francisco, Cal.—It is reported that the Municipal Railways of San Francisco plans the construction of 20 miles of new tracks into residence districts not touched by city lines.

Tidewater Southern Company, Stockton, Cal.—This company has withdrawn its application filed with the Railroad Commission of California for authority to extend its line from Hatch to Irwin City. The commission has issued an order granting the request and dismissing the company's application for authority to build the extension.

Ferrocarril Electrico De Matanzas S. A., Matanzas, Cuba.—A report from this company states that operation will be begun this month on its line between the city of Matanzas and suburbs, about 12½ miles. Storage battery cars of the Electric Storage Battery Company will be used. Luis Amezaga, Matanzas, president.

Miami, Fla.—Bids will be received by the Board of County Commissioners of Dade County, Fla., at the office of the Clerk of the Board of County Commissioners, Miami, up to Dec. 14, for the construction of the Miami Causeway across Biscayne Bay, connecting the city of Miami and the town of Miami Beach. The structure will consist of approximately 4000 lin. ft. of viaduct and 13,000 lin. ft. of embankment. The embankment portion will be composed of sand and will be protected and retained by either a creosoted timber bulkhead or a concrete wall on each side. Bids will be received on both types of construction, and the type to be constructed will be selected after the bids are opened. This portion of the structure will be 105 ft. wide. The viaduct portion will consist of a series of reinforced concrete girder spans, providing for a roadway 20 ft. wide, a sidewalk 5 ft. wide, and an electric railway track outside of the roadway.

St. Petersburg & Gulf Railway, St. Petersburg, Fla.—This company reports that construction is now under way on its proposed Coffee Pot Loop, 1½ miles.

Chicago, Fox Lake & Northern Electric Railway, Chicago, Ill.—The Illinois Public Utilities Commission has granted a certificate of convenience and necessity to the Chicago, Fox Lake & Northern Electric Railway for the construction of an electric railway from Evanston to Palatine. It is reported that work on the proposed railway will be begun early next year. L. K Sherman, Chicago, chief engineer. [Nov. 25, '16.]

East St. Louis & Suburban Railway, East St. Louis, Ill.—This company is now at work repairing and otherwise placing its lines in East St. Louis in first-class condition at a cost of more than $200,000.

Southern Illinois & St. Louis Railway, Harrisburg, Ill.—Work will be begun at once on this company's proposed line to connect Harrisburg, Marion, Johnston City, Herrin, West Frankford, Benton and St. Louis. The first work will begin at Marion and the road will be built north toward Johnston City. An office will be opened in Marion immediately and placed in charge of L. F. Kipley, who will be cashier and general auditor. Frank Payne will continue in charge of the engineering department. It is reported that negotiations are under way for the purchase of the Eldorado, Marion & Southwestern Railroad. [Oct. 21, '16.]

Waukegan, Ill.—It is reported that a movement is now on foot among local capitalists for the organization of a gigantic stock company in Waukegan which plans to secure rights to operate a street railway in Waukegan and to take over the holdings of the Chicago, North Shore & Milwaukee Railroad in case the latter company does not obtain a franchise from the city in the immediate future. The franchise matter is now at a standstill. The Chicago, North Shore & Milwaukee Railroad is not inclined to tender any further proposition other than the offer of $40,000 and building of extensions while the City Council is holding out for the payment of $60,000 claimed as due the city from the company in payment for special assessments.

Wichita Railroad & Light Company, Wichita, Kan.—This company is considering the construction of a street car trestle across the Arkansas River at Douglas Avenue.

Alexandria (La.) Municipal Railway.—Work will be begun at once by the Alexandria Municipal Railway on the construction of an extension beginning at the corner of Second and Casson Streets, thence in a southerly direction along the railroad to Third Street, down Third Street to a point to be determined. It is possible that the extension will eventually go down Third Street to the old Watkins tracks and out through the hardwood mill district across to Lee Street near Vance Avenue.

Lewiston, Augusta & Waterville Street Railway, Lewiston, Me.—It is reported that this company plans to construct an extension to Rumford.

Winnipeg (Man.) Electric Railway.—Negotiations are under way with the Winnipeg Electric Railway to construct a line between Transcona and Winnipeg, and it is expected that this line will be built next year.

Worcester (Mass.) Consolidated Street Railway.—It is reported that this company proposes to construct an extension to Rochdale.

Detroit (Mich.) United Railway.—Operation has begun by the Detroit United Railway on the new extension of the Grand Belt line. The route determined upon connects the line on Forest Avenue east with the Grand Belt line on Junction Avenue. Combined it will be called the Grand Belt line.

United Light & Railways Company, Grand Rapids, Mich.—This company has sold $1,500,000 of convertible debentures, of which the proceeds of $400,000 will be used to retire underlying bond issues, for payment of a small amount of floating debt, and the balance for construction requirements of subsidiary companies during 1917.

Michigan Railway, Kalamazoo, Mich.—Right-of-way is being secured by the Michigan Railway for its proposed extension from Flint to Owosso.

***Jefferson City, Mo.**—It is reported that preliminary surveys have been made by interests connected with the Illinois Traction System for the construction of an interurban electric railway from Jefferson City to Mexico, via Fulton, about 45 miles.

Kansas City (Mo.) Railways.—The engineers of the Kansas City Railways recently condemned the Seventh Street Bridge in Kansas City, Kan., and arrangements are now being made for the erection of a new bridge, at a cost of $260,000, to be paid for by the company and two steam roads over the tracks of which the viaduct passes. Cars will be stopped at each end and passengers will walk across the old structure pending construction of the new one.

***Woodbury, N. J.**—Plans are being made to construct a line from Woodbury to Paulsboro and possibly to Gibbstown and Pennsgrove. Thomas F. Deegan, Philadelphia, is reported interested.

New York Municipal Railway, Brooklyn, N. Y.—The Public Service Commission for the First District of New York has approved the award of a contract by the New York Municipal Railway Corporation to the G. E. Engineering Company, Inc., New York City, the lowest bidder, at $116,702.75 for the furnishing of tunnel lighting, station lighting, heating and ventilating systems in the Broadway and Canal Street subways. The work of installation must be completed by April 15, 1917.

Carolina & Yadkin River Railway, High Point, N. C.—This company has discontinued operation of the storage battery car placed in service on its line between High Point and Thomasville last July.

Northern Ohio Traction & Light Company, Akron, Ohio.—*The Traction Bulletin*, published by the Northern Ohio Traction & Light Company, in its issue of Nov. 25 states that among other things contemplated by the retiring directors for the immediate future, the Akron terminal project is to be carried forward to completion without delay by the new owners. In general, this paper ventures the prediction that although the retiring executives have authorized liberal expenditures for additions to the property, keeping pace with the growth of the territory served, those to whom the control now passes will be even more ready to build for the future.

Dover, Millersburg & Western Railway, Dover, Ohio.—Plans are under way by this company for the construction of a new bridge over Sugar Creek. The bridge will be about 200 ft. long and will have concrete foundations with steel spans. No contracts have as yet been awarded. D. F. A. Wheelock, Woodward Building, Warren, Pa., engineer. [Oct. 21, '16.]

Ardmore (Okla.) Railway.—This company reports that plans are being made for some new city and interurban extensions.

Sand Springs Railway, Tulsa, Okla.—This company will construct an extension from Crib Siding to Lake, 3½ miles.

Oregon Electric Railway, Portland, Ore.—It is rumored that the Oregon Electric Railway, a subsidiary of the Spokane, Portland & Seattle Railway, will build an extension to the Hill timber tracts, above Cascadia, branching off the main line at Salem, passing through Stayton and east of Scio, following the South Fork of the Santiam River, opposite Lebanon, thence through Waterloo into Sweet Home and Foster. This route will open a well developed district that now has no railroad facilities. It is reported that location surveys have been made.

***Dover-Rossville Transit Company, Dover, Pa.**—The Public Service Commission of Pennsylvania has announced its approval of a plan to operate trackless trolley cars on the public highways submitted by the Dover-Rossville Transit Company. This company proposes to operate a trackless line between Dover and Rossville.

Johnstown (Pa.) Traction Company.—The construction of an extension from Johnstown to New Florence is being contemplated by the Johnstown Traction Company. It is estimated that the cost of such a line would be about $300,000.

Hull (Que.) Electric Company.—Work will be begun next spring by the Hull Electric Company double-tracking its lines on Montcalm Street and Chelsea Road from Graham's Corners to Montclair Street, also constructing a loop at the Mountain Road.

Charleston Consolidated Railway & Lighting Company, Charleston, S. C.—This company will double-track its line from Five-Mile House to the Navy Yard, 1½ miles.

Memphis & Rugby Railroad, Memphis, Tenn.—This company, which is constructing an electric railway between Memphis and Rugby, reports that the line will be in operation about Jan. 1. The line will be 2 miles long and will reach Rugby Park. The company will also do a general lighting business in Rugby.

Morgantown & Wheeling Railway, Morgantown, W. Va.—W. E. Glassock, receiver of the Morgantown & Wheeling Railway, has let a contract to H. D. Eichelberger, Richmond, Va., to construct an extension from Price Station to Blacksville, W. Va.

SHOPS AND BUILDINGS

Illinois Traction System, Peoria, Ill.—This company has made changes in its Urbana station, the business of the traction company requiring the entire station. The Urbana Light, Heat & Power Company has been removed into the first building west of the station.

Detroit (Mich.) Railway.—It is reported that this company has purchased a site at Lake Orion Junction on which it will erect a new carhouse and power house next year.

Northern Ohio Traction & Light Company, Akron, Ohio.—This company is negotiating for the purchase of the warehouse of the Canton Feed & Milling Company on Cherry Avenue, Canton, as a site for a new freight station. A substantial building is to be erected as soon as the site is secured.

Philadelphia & Garretford Street Railway, Upper Darby, Pa.—It is reported that this company contemplates the construction of a passenger and freight station on the West Chester Pike, in Media, a few feet west of the present terminal at Sixty-ninth Street.

POWER HOUSES AND SUBSTATIONS

Tri-City Railway & Light Company, Davenport, Iowa.—This company has purchased a 20,000-kva. Westinghouse turbine together with condensing equipment for installation in its plant at Moline, Ill. Plans are now being prepared for the installation as well as an addition to the power plant building, which will be required to accommodate the new unit. All the equipment has been ordered and will be delivered next summer. The total estimated cost of equipment and improvement is $300,000.

Piedmont Railway & Electric Company, Burlington, N. C.—This company proposes to erect a transmission line to Elon College and Gibsonville, about 8 miles.

Memphis & Rugby Railroad, Memphis, Tenn.—This company, which is constructing a line between Memphis and Rugby, reports that it is purchasing machinery and erecting a power plant at Rugby Park.

Monongahela Valley Traction & Light Company, Fairmont, W. Va.—Arrangements are being made by the Monongahela Valley Traction Company for increasing the output of its power plant at Hutchinson. Contract, it is understood, has been placed for an additional 1150-kw. generating unit. The addition to the power station will provide space for the installation of two additional units when needed.

Waupaca Electric Service & Railway Company, Waupaca, Wis.—This company expects to make a number of improvements in its power plant.

INDUSTRIAL NEWS

Review of Trade and Market Conditions

Rolling Stock Purchases **Business Changes** **Trade Literature**

WHO SHOULD CARRY THE REPAIR PARTS IN STOCK?

Manufacturers Continue to Discuss This Important Question —One of Them Considers It a "Fifty-Fifty" Proposition

Opinions on this subject from a number of manufacturers were presented in the article beginning on page 1135 of last week's issue. They may be briefly summarized into the statement that the manufacturer of a standard product should be prepared to furnish repair parts promptly, that the railway should be notified when standard designs are to be changed and patterns destroyed, but that the railway should see to it that enough local stock is carried to avoid the necessity of making rush demands on the manufacturers for repair parts subject to periodic renewal because of wear. Twelve representative manufacturers discussed this question in last week's issue. Communications have been received from other manufacturers and abstracts of these are given below:

FIFTY-FIFTY PROPOSITION

E. G. Marble, American Engineering Company, the manufacturer of the Taylor stoker, writes as follows:

"We have always felt that good business policy made it advisable for any manufacturer to carry in stock, so far as possible, all parts normally subject to call for repairs for all the product which he manufactures. Existing conditions many times make it impossible to carry in stock a sufficient quantity to provide for shipment immediately upon receipt of order. But we are satisfied that from an economic standpoint in the long run the best results will be obtained if the manufacturer carries a stock of these parts, rather than each user should carry an individual stock in sufficient quantity to protect himself against normal breakdowns.

"So far as tying up capital in repair parts is concerned, this is a 'fifty-fifty' proposition, because when the manufacturer does it he necessarily has to add interest charges to the price he asks for the parts, and on the other hand, if the individual customer carries parts, his money is tied up, with consequent carrying charges, even though he may not so figure it."

ELECTRIC TOOLS ARE STANDARDIZED

G. P. Blackiston, of the Van Dorn Electric Tool Company, is of the opinion that if the repair parts needed will tie up the earning capacity of a car, then certainly it would seem that the railway would consider it very important that its supply department keep such parts in stock. A manufacturer should, of course, carry a sufficient quantity to meet normal demands. "Consider, for example," says Mr. Blackiston, "the portable electric tool which we manufacture. This particular field has been one that has shown rapid development. A great many changes have been necessary. Also, these tools are used in 'hard service,' and it is expected that a user will keep all parts of a tool of this character in stock, unless he can delay his work pending receipt of repair parts from the manufacturer."

THE ROAD SHOULD CARRY NON-STANDARDIZED PARTS

R. G. Clapp, of the Brown Hoisting Machinery Company, writes as follows:

"It is our plan and intention to carry stock parts for our regular standard product, but where anything special is ordered we feel that we should not be obliged to carry the spare parts for the customer on this class of material. The chances of his making the material himself, or at least of not wanting to purchase from us, are such that it looks and always has looked unwise for us to attempt to anticipate his possible repair parts. We cannot agree with the position you state the railroads are taking with reference to repairs. That would mean that the manufacturer would have to bear all the expense of financing repair parts for all of his product without knowing the condition of service of all the apparatus involved—a position which this company would creditably decline to assume."

OIL PUMPS REQUIRE FEW REPAIRS

B. F. Geyer, of the Wayne Oil Tank & Pump Company, says:

"Our pumps require very few repairs as compared with the total number sold. As nearly as we can tell, less than 10 per cent of the outfits sold ever require any repairs.

"I know from experience that some manufacturers do not give the attention to repair parts that they should. I feel that every manufacturer who is called upon to furnish repairs for any device he is marketing should make a special effort to have these repair parts in stock and ready for shipment instantly. There are some extenuating circumstances in connection with this. If it is an exceptionally old model the purchaser should have some patience with the manufacturer.

"I do not believe that the purchaser should be expected to carry regular repair parts in the majority of instances. I further believe that there is a point of compromise on this subject. In my opinion, if the purchaser has equipment the parts of which are subject to breakage under service, it would be advisable for the purchaser to carry such repair parts in his own stock. If he has a device or equipment that is not particularly subject to breakage at any particular point, then he may depend entirely on the manufacturer for such repair parts as he might need."

STOCKS FOR OLD MODELS ARE CARRIED

F. W. Buchanan, Independent Pneumatic Tool Company, discussing this question from the standpoint of the manufacturer of a highly standardized tool, says that the purchaser of a machine "is entitled to prompt service when repairs are required and while it would be absolutely impossible with a great many manufacturers to supply any pieces that might be ordered from stock, the customer's interests should be considered sufficiently to protect him against delays by giving the most prompt service possible. When you consider that we manufacture approximately 100 different sizes and types of tools which contain anywhere from 25 to probably 125 various small parts from small screws up to pieces requiring the very best and most accurate finish, it is difficult to guarantee immediate shipment of any part at all times. However, with a tool such as we make, which is generally in continuous service and considered a big labor-saver, the manufacturer is not only under obligations to see that the user does not suffer loss on account of unnecessary delays by having tools out of commission but should figure a reasonable interest on the investment, the expense of storage space and insurance, the loss occasioned by parts being left over as obsolete when new models are brought out and the expense of handling small shipments. He should then plan to keep a sufficient stock on hand to make as nearly immediate shipment as possible.

"We might add that it has always been our policy, when bringing out new models, to provide a stock of parts for the old models sufficient to maintain the tools of that type which were out until such time as the customer received sufficient service to warrant the replacement of his old machines with the newer models."

CAR BUILDERS KEEP TRIMMINGS IN STOCK

A. H. Sisson of the Southern Car Company says that as far as the car-building business is concerned, it has possibly a few of the minor trimmings, etc. As a rule, however, where the articles manufactured are standard, and are made up in large quantities, he believes that it would be good business for the manufacturer to keep repair parts on hand at all times.

MANUFACTURER HAS POOR EXPERIENCE IN ATTEMPTING TO GAGE THE MARKET

Roads Report No Orders in Sight and Then Ask for Quotations

The sales manager of a large manufacturing company selling to the electric railways has some comments to make on the remarks of Nic Le Grand of the St. Louis Car Company, which appeared on page 1135 of last week's issue of this paper in Industrial News.

Mr. Le Grand cited as a "fault peculiar to railway buying" that a salesman had interrogated the department heads of a road and got a uniform reply that there was no business in sight for his company, but within ten days in came a telegram pleading for parts to be shipped immediately. This experience was similar to that of the sales manager first mentioned. The observation made by him is that unless the roads know what they will need for future use how can the manufacturers afford to purchase in advance large supplies of raw materials and thus be able to lower costs? Continuing, he said:

"In order to get some tangible idea of what the larger roads would be apt to purchase during the next six months or a year, the writer recently sent a letter to his district salesmen explaining the raw material situation and requesting them to get in touch with the large buyers. The salesmen were requested to obtain an idea of what the next year's requirements were likely to be.

"The replies indicated that the market was practically dead, yet in a dozen or two instances, after we had received advice that there would be nothing doing for six months, these very companies came into the market for large orders. The reason advanced for misleading the manufacturer's representatives was that they did not want to be pestered by having a swarm of supply men calling on them and taking up their time several weeks or months before they were ready to buy.

"We cannot whine about this practice, but it certainly is not co-operation, or perhaps we did not reach the right people. Of course, there are some good reasons for railway companies not desiring to announce probable purchases, yet how else can a manufacturer gage the market? Perhaps some one can make a suggestion."

BUYING REPAIR PARTS ON AN ANNUAL BASIS

Roads Are Urged to Order for Monthly Delivery—Instances of Such Orders Are Cited

By WARREN L. BOYER

Of the Bemis Car Truck Company

Referring to the discussion in your issue of Nov. 25, "How far should a manufacturer go in keeping in stock renewal parts for service repairs to his product?" I believe that the manufacturer should keep a certain amount of repairs on hand at all times to meet at least the average demand of customers for a period of six months. As a rule, a manufacturer can tell from past orders approximately the amount of stock to carry.

Under conditions such as these it sometimes happens that the demand for a certain article is unusual, exhausting the supply before the manufacturer has a chance to replace it. This condition applies especially to those things that the manufacturer does not make himself but for which he depends on either the open market or other manufacturers to supply. I do not think, however, that it is fair for the railroad to expect the manufacturer to assume the entire burden in carrying repair parts for his particular non-standardized equipment subject to immediate call. The manufacturer should have due notice from the railroad to prepare himself for an unusual demand. The manufacturer has no control over the plan of work followed by the various roads, such as the spasmodic overhauling of equipment in periods of two or three years, when such a practice is not standard on a particular road. This general overhauling naturally takes more repair parts than has been the custom of that railroad to buy for several years previous. We think it is up to the railroad company to arrange for stock in advance of the time that it is actually required.

Our company is willing at all times to meet its customers more than half way. We endeavor to have them state what their yearly requirements will be and to tell us approximately the periods of the year at which they will call on us for certain quantities of the yearly requirements. In this way we are usually able to have the material on hand thirty to sixty days before it is actually needed. We can then make prompt shipments to them. To make up enough material for a year's requirements means larger orders to run through the shop. This would reduce our shop costs, and the saving would pay the interest charge for carrying the material from the time it is made to the time it is called for.

The Springfield (Mass.) Street Railway and the Worcester Consolidated Street Railway are working with us on such a yearly basis. For instance, they will give us an order on the first of the year for 1000 pieces of a certain kind, specifying shipments in equal monthly installments, starting March 1 and continuing until the order is completed. In this way we can handle our work in the shop to advantage, giving them material at the time wanted, saving them money, and making a better percentage ourselves.

It would be a good thing if more railways realized what an advantage it would be to have such a working agreement with a reliable manufacturer instead of waiting until the last minute and then shopping around for hurried competition on a certain product.

CROSSING SIGNAL MAKERS REPORT ACTIVITY

Large Steam Road Sales Reported—Electric Railway Prospects Bright

Comments on the highway crossing signal article appearing on page 1085 of the Industrial News department of this paper for Nov. 18 have been received from two manufacturers. The article pointed out that there have been very few purchases of highway crossing signals during 1916, although according to one informant inquiries have been quite numerous. The question was whether reliability of action was not the greatest desideratum.

A. M. Adams, secretary, the Protective Signal Manufacturing Company, Denver, Col., writes as follows:

PROSPECTS FOR INCREASED SALES IN 1917-1918

"We have enjoyed an exceedingly good business in crossing signals embodying our wig-wags, bells, and other devices sold the steam roads during the last six months. We have also received some orders from two or three of our regular customers in the electric railway field. However, our orders from steam roads far exceed the orders from the electric roads, and the only explanation which we can give for this fact is that the electric railway companies throughout the country are loath to enter what is considered by many a new field in signaling.

"From conversations which the writer recently had with a number of electric railway men throughout the East he was impressed with the fact that they were not quite sure that any crossing signal now on the market was really efficient and effective. The wig-wag and bell signal seem to be favored more than lights and bells, and in a majority of cases the electric railways are holding back awaiting action of the various State railroad commissions on this question.

"We have not noticed any considerable increase in inquiries from electric railways this last year, and we have felt that this was due to the fact that they were not quite sure as to what their future plans would be in connection with crossing protection. In other words, they were not yet ready to go definitely into the matter. We believe, however, that the prospects are very good for a considerable market among the electric roads during the next two or three years.

"While the question of reliability is a very important one, still we do not believe that it is the chief one to be met in furthering advance in sales to electric roads. In our opinion, the greatest question is what action the various utilities commissions and State railroad commissions are going to take in this matter, and whether, by installing crossing signals, the railway companies will be exonerated of any blame for crossing accidents providing they can prove that a signal operated at the time of accident. If the courts will take this stand, we believe the electric roads will not hesitate to put in more highway crossing signals."

ELECTRIC RAILWAYS SHY AT EXPENSIVE SIGNALS

E. W. Vogel, president Chicago Railway Signal & Supply Company, Chicago, says:

"It is a fact that on electric railways, so far as we know, very few purchases of crossing signals have been made.

"On steam railways, our business in crossing signals has been better than ever before. For example, only recently we sold over 100 for one installation on the Chicago Great Western Railroad, and it is a satisfaction to note that these signals were all of the very best and highest price types that we manufacture, with large locomotive bells, relay boxes, and the very best material throughout.

"The difficulty on electric railways, as we see it from our past experience, is that these roads want to put in crossing signals, but usually wish to purchase the materials required for about half of the price that it costs steam railroads. This, of course, cannot be done when reliable signals are furnished. The result is that some of the electric railways have experimented with cheap contrivances that, in the end, do not give satisfaction, and the trouble experienced with these cheaper contrivances, we believe, is the real cause for the lack of a more general installation of crossing signals."

POLE PRODUCER OFFERS NEW COMPLETE SERVICE

Utility Poles to Be Shaved, Gained, Bored and Creosoted by Producer

The Paducah Pole & Timber Company, Paducah, Ky., is about to offer to its customers special pole service at comparative cost that will make it economically attractive for the railway company to have the pole producer finish the poles ready for immediate setting on delivery. The company's sales manager, John L. Fay, has had experience in operating distribution and transmission lines for electric railways and other utilities, and is familiar with the difficulty of obtaining and retaining suitable labor in public utility pole yards. Therefore, he proposes to finish poles at his yards, meeting railway specifications, and deliver them ready for setting.

The plan is to shave the pole for its entire length, remove the outer bark, fiber, and foreign material, and dress the knots down smooth. The poles are then to be taken to the treating vats and receive an open-tank treatment.

The course of treatment is to be as follows: The poles will be seasoned for at least six seasoning months before treatment; all fiber, inner bark and foreign substance will be removed from that portion of the pole, from the butt end to a point 1 ft. 6 in. above the ground line. Then the pole will be placed in an upright tank, with the butt fully and continuously submerged in the preservative not less than fifteen minutes, when the atmospheric temperature is 70 deg. F., or higher, and a proportionately longer time when the temperature is lower, or until such time as will be required to cause the wood to become as thoroughly treated as it would be in fifteen minutes at atmospheric temperature of 70 deg. F. After the foregoing treatment has been carried out the poles will be brush treated with the same preservative for the entire length above the butt where the preservative used in the open-tank process reached.

The principal purpose of this method of preservation is to secure an increased life for the pole not only below but above the ground, so that the upper portion can be retreated by the brush method while it is standing in its old position. After this treatment the pole can be sawed off at the surface of the ground and reset, or else moved to some other location on the system where a shorter length of pole is sufficient. The usable life of the pole can thus be increased sufficiently to justify the expense of the treatment above the ground line. This scheme, it is believed, will aid the utility companies materially in that they can arrange, at a nominal cost, to have the work done for them by an efficient organization. It will also relieve the utility superintendents from maintaining temporary organizations for this class of work.

COPPER WIRE BASE PASSES FORTY-CENT MARK

It was reported early in the week that copper wire base could be obtained in limited quantities for 1916 delivery at 40 to 41 cents. The price, however, was nominal, each sale having its own quotation. For January shipments, quotations of 39.75 cents are being made and 37 cents for March, all quotations f.o.b. factory.

Practically all mills are sold out to Feb. 1, and some as far in advance as July 1, 1917. For this reason it is very difficult to obtain prompt deliveries, and even if possible to get them they command a premium of 1 cent to 1.5 cents.

On Monday, copper was quoted at 34 cents for 1916 delivery in a very strong market. Prices for 1917 delivery sloped off from this mark, but did not go below 30 cents, the quotation for last quarter delivery.

Buyers will therefore enter the December market with the metal around 35 cents and with practically none to be had except that held for better prices by speculators.

ROLLING STOCK

Richmond Light & Railroad Company, New York, N. Y., is said to be in the market for one steel dump car.

Trenton & Mercer County Traction Corporation, Trenton, N. J., is reported to be in the market for a number of cars.

Tri-City Railway & Light Company, Davenport, Iowa, is reported to be considering the purchase of ten or twenty city cars.

North Carolina Public Service Company, Greensboro, N. C., is reported to be considering the purchase of fifteen single-truck cars.

Northern Ohio Traction & Light Company, Akron, Ohio, has ordered ninety-five car bodies, fifty-seven motor trucks and ten trailer trucks from the St. Louis Car Company.

International Railway Company, Buffalo, N. Y., noted in the ELECTRIC RAILWAY JOURNAL of Aug. 5, 1916, as losing sixteen cars in a fire, is reported to have ordered sixteen cars from the G. C. Kuhlman Car Company.

East St. Louis & Suburban Railway Company, East St. Louis, Ill., has ordered forty-five new steel bodies for the cars now in use, which, when rebuilt, will be of the pay-as-you-enter type.

Memphis & Rugby Railroad, Rugby, Tenn., has purchased a new Edison storage-battery car from J. B. N. Cardoza, Inc., Norfolk, Va. This car, which will be used between Memphis and Rugby, will be put into service about Jan. 1, 1917, when the road will be finished.

TRADE NOTES

William J. Hammer, consulting electrical engineer, announces the removal of his office to 55 Liberty Street, New York City.

Arthur V. Farr, who for the last three years has been advertising manager of the SKF Ball Bearing Company, Hartford, Conn., has accepted the position of sales manager of the Hess Steel Corporation, Baltimore, Md.

Electric Cable Company, New York, N. Y., announces the opening of a Chicago warehouse with a complete stock of "Ecco" insulated wires and cables, and is now prepared to make prompt shipments of all sizes of its stock from this point.

Electric Porcelain & Manufacturing Company, Trenton, N. J., has acquired the plant of the Climax Pottery Company on New York Avenue, as a new factory for the manufacture of its electric porcelain specialties. A new addition, about 130 ft. x 150 ft., will be erected at an estimated cost of $70,000. H. T. Paiste, Philadelphia, is president.

Holden & White, Chicago, Ill., report that the Anderson Brake Adjuster Company has recently received an order for equipping twenty-five new cars being built by the Omaha & Council Bluffs Street Railway. This will complete the entire equipment of this property with these brake-slack adjusters.

Consolidated Car Heating Company, Albany, N. Y., announces an order for 180 geared-type pneumatic door engines with cut-off at the end of stroke to go on the Pressed Steel Car Company's forty-five cars ordered for the Long Island suburban service of the Long Island Railroad. These engines will be fitted with electro-pneumatic control. The engines are similar to the Consolidated types used at Rochester and at Brooklyn.

J. A. & W. Bird & Company of Boston, Mass., distributers of Ripolin enamel paint, announce that George Price, formerly manager of the New York office, 120 Broadway, will hereafter handle the sales department covering the entire territory south of New York as far west as the Mississippi, and also including the states of Louisiana and Texas. Mr. Price has been in charge of the Metropolitan district for the last eight years and recently completed an extensive trip covering this territory.

Page & Hill Company, Minneapolis, Minn., announces the addition to its sales force of Buford Adams of Kansas City, who will act in the capacity of sales engineer. Mr. Adams is well known, particularly throughout the Southwest, as a practical engineer and manager of public utility properties. At one time Mr. Adams was manager of the Missouri & Kansas Telephone Company at Carrollton, Mo., Joplin and St. Joseph. He then went to Denver, and was employed by the Colorado Telephone Company as assistant engineer. Mr. Adams later traveled for a telephone manufacturing company in the capacity of sales engineer, and for a period of time was general manager of the Independent Company's plant at Waco, Tex.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., announces an extension of its present bonus system to include salaried and office employees on hourly rates by which they will receive a bonus of 8 per cent of their salary each month providing their total excusable time absent and late during the month does not exceed six hours incurred on not more than three occasions. An additional 4 per cent will be given each month to the employee who has not lost any time from work during the month through absence or tardiness, thus enabling those to obtain an increase in earnings of twelve per cent for a 100 per cent attendance. Several thousand employees in the Pittsburgh district are benefited by the granting of the bonus.

Westinghouse Electric Export Company, East Pittsburgh, Pa., has recently sold twenty-seven new forced-draft, high-reserve capacity stokers of the underfeed type for service in Japan, twenty of them being sold to the Osaka Electric Light Company, two to the Negoia Electric Light Company, and five to the Imperial Steel Company. They are all for use with 600-hp. boilers. The orders also included engines for operating the stokers, turbine and motor-driven forced-draft fan units, controllers, and other auxiliaries. No better illustration of the progressiveness of Japanese concerns in changing over their power plants to the most up-to-date, high-capacity equipment could be found than what these orders indicate. By the use of these stokers the plants are able to obtain from two to three times the capacity of the boilers.

Consolidated Car Heating Company, Albany, N. Y., announce that, effective Dec. 1, 1916, the following changes and promotions have been made in the sales organization of this company: C. A. Eggert, formerly assistant in the Chicago sales office, will be in charge of that office, and H. L. Hawley, formerly assistant in the New York office, will be responsible for the New York office. Thomas Farmer, Jr., heretofore vice-president in charge of the Eastern sales office at New York, has resigned in order to devote his time to his large interest in automobile garages in New York City. Mr. Farmer has been associated with the company for the past eleven years, and the company regrets the necessity of his resignation; it is pleased to state, however, that it will have the benefit of his services in an advisory capacity. W. S. Hammond, Jr., formerly vice-president in charge of the Western sales office, will be vice-president in charge of all sales of the company.

ADVERTISING LITERATURE

Johnson & Johnson, New Brunswick, N. J., are distributing catalog 110 on "First Aid to the Injured."

Hanlon & Wilson Company, Wilkensburg, Pa., is distributing a pamphlet on its "Vak Klean" portable vacuum cleaning machine.

Roller-Smith Company, New York, N. Y., is distributing bulletin 201 on its portable storage-battery equipment for use with the Roller-Smith bond tester.

Imperial Car Cleaner Company, Newark, N. J., renovator of electric, steam or trolley cars, has issued a bulletin of directions for handling work on cane and plush cushions.

Stow Manufacturing Company, Binghamton, N. Y., has issued a miniature of its bulletin 102, on the Stow flexible shaft portable tools. It is not only a novelty but is most complete in detail.

Electric Railway Equipment Company, Cincinnati, Ohio, has just issued a well illustrated 12-page bulletin on Elreco tubular steel poles and combination railway and lighting poles.

Automatic Reclosing Circuit Breaker Company, Columbus, Ohio, is distributing bulletins on its automatic reclosing circuit-breaker system, the theory and operation of these circuit breakers, the different types used and the important considerations necessary to perfect individual motor circuits.

International Motor Company, New York, N. Y., is distributing a pamphlet showing auto-buses in use by a number of railways and motor truck lines. Among these is shown a unique adaptation of the Mack truck as a railroad bus used by the Unitah Railway Company, Unitah, Col., and also a Mack 2-ton pay-as-you-enter bus used by the New York State Railways, Rochester lines.

M. W. Kellog & Company, 50 Church Street, New York, N. Y., manufacturers of piping material, has issued a ninety-page bulletin on lap-welded steel pipe, welded steel tanks, vanstone joints, welded nozzles and welded flanges. In addition, a number of the pages are devoted to the Bulkeley barometric injector condenser, giving illustrations, drawings and performance curves of the different types of this injector.

Bound Brook (N. J.) Oil-Less Bearing Company has just issued a well-illustrated booklet of forty-eight pages on its type of bearings, washers and clutch releases. Several pages of the booklet are devoted to the story of the trolley wheel bushings used by the Colorado Springs & Interurban Railway Company. In addition there are a number of full-page illustrations of battleships and of aeroplanes on which the bearings of this company are used.

General Railway Signal Company, Rochester, N. Y., has just issued Vol. I of its direct-current electric signal appliances. This volume, which is handsomely bound, contains sections E to L inclusive, each section covering the following items respectively: Relays, indicators, cable posts, battery chutes, bond wires, etc.; power generating and distributing equipment, generators, motor generators, switchboards, etc.; electric interlocking machines and appliances; electrically operated signals, mechanisms, poles, bearings, ladders, etc.; electrically operated switch machines, derail, layouts and fittings; circuit-controlling appliances, switch-circuit controllers, bridge circuit closers, locks, etc., and electro-mechanical interlocking machines and appliances.

NEW PUBLICATIONS

Some Graphical Solution of Electric Railway Problems. By A. M. Buck, Engineering Experiment Station, University of Illinois, Bulletin No. 90. Copies can be secured gratis from W. F. M. Goss, Director, Urbana, Ill.

This bulletin, of which an advance notice appeared in the issue of the ELECTRIC RAILWAY JOURNAL for Aug. 12, 1916, page 281, is now ready for distribution.

Comparative Railway Statistics—United States and Foreign Countries—1913. Bureau of Railway Economics, Washington, D. C. Seventy-eight pages. Paper.

This pamphlet, just released, gives the latest available comparative data regarding the railway situation in the United States and in the principal foreign countries.

King Peacock's Word Stands High

"A King's evidence in court against all of a rank below him was accepted without question."

Thus ran the old law of Erin.

If you have King Peacock to testify for you in court his testimony concerning responsibility for accidents will also be accepted without question.

Because no honest judge and jury can fail to respect your use of a brake that has proved its accident-prevention qualities on hundreds of high-class electric railways throughout the land.

One adverse verdict would have paid for many Peacocks!

Why not tie up now with King Peacock's reputation for making good?

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An organization prepared to handle all work which calls for the application of chemistry to electric railway engineering—such as the testing of coal, lubricants, water, wire insulation, trolley wire, cable, timber preservatives, paints, bearing metals, etc.
Correspondence regarding our service is invited.
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ELECTRICAL TESTING LABORATORIES
Electrical, Photometrical and Mechanical Testing.
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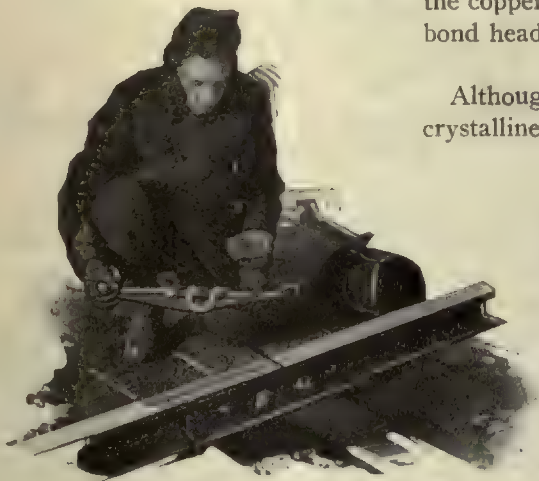

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Have You a REAL Return Circuit?

You can have one by bonding all your rail joints with the

Lincoln Bonding System

With it, you are sure to secure the highest possible conductivity, because the Lincoln System assures an actual flow of the copper into the steel and of the steel into the copper at the bond head.

Although bond and rail are merged into one structure, the crystalline nature of the rail is not altered.

Remember, too, that the Lincoln System will save you from 20 to 50 cents per bond. May we send further details?

The Lincoln Bonding Company

636 Huron Road, Cleveland, Ohio

AGENTS:

LEWIS & ROTH COMPANY, 1012 Liberty Bldg., Philadelphia, Pa.
CHARLES N. WOOD COMPANY, 14 Federal Street, Boston, Mass.

A Word to Employers

You can secure just the man you desire to strengthen your organization by placing an advertisement in the Searchlight Section of the

ELECTRIC RAILWAY JOURNAL

This paper is read by progressive men, many of whom are ambitious for better positions than they now have. They study our "Positions Vacant" columns each week for opportunities for advancement.

You can get in touch with a number of these competent men and select the one best fitted for your needs, by stating in an advertisement in our Searchlight Section the experience and qualifications you require and telling what you have to offer. The cost will be only 3 cents a word, minimum charge $1.50 an insertion.

We suggest that you use in the advertisement either your own name, that of one of your employees, or a local post office box number or street address, so that the replies (letters and telegrams) will come direct to you. If you prefer to have the replies addressed to a box number in one of our offices, they will be enclosed in new envelopes and remailed to you promptly each day.

Hundreds of prominent employers now use this method of securing the men needed in their organizations. May we not help you also?

Electric Railway Journal
239 West 39th Street
New York City

The Coal & Iron National Bank of the City of New York

Capital, Surplus & Profits $1,635,000
Resources Nearly $10,000,000.

Offers to dealers every facility of a New York Clearing House Bank.

A. L. DRUM & COMPANY
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VALUATIONS AND FINANCIAL REPORTS,
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OF ELECTRIC RAILWAYS

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The Accepted Authorities

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and the

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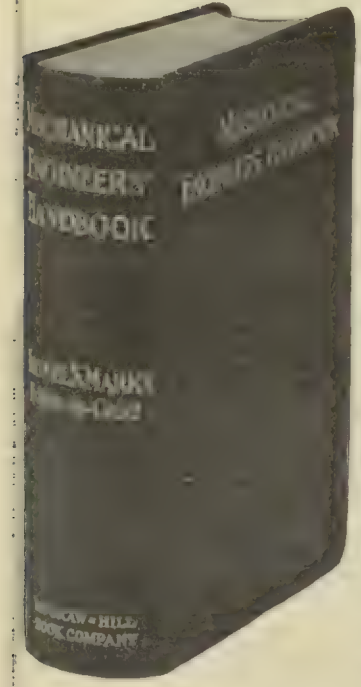
Mechanical Engineers' Handbook

(Based on the Hütte)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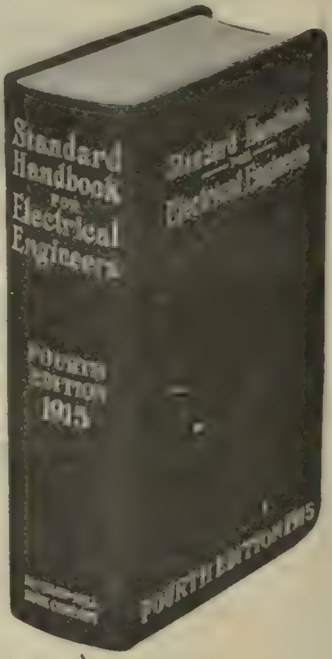
There are 25 sections, with the subject matter grouped so that you can find all the material on a given subject in one section.



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From now until January 1st, 1917, we will stamp your name in gold (or the name of the recipient) on any McGraw Hill Book, *free of charge.*

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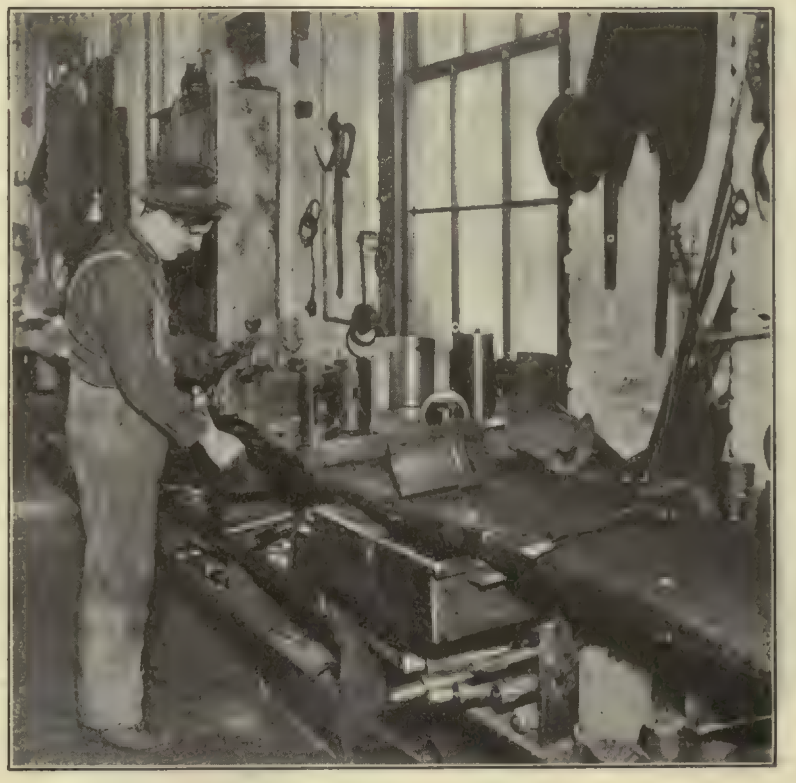
Columbia Bearings

Are Made By Experts



There's a lot more to making a good bearing lining than pouring the metal into a mold.

There's the right formula for the service, and the need for seeing that the mixture is made at just the right temperature so the metals will really mingle.

There's the need of making the inside of the bearing as smooth as glass, for in this case: "What starts well, ends well."

Whether your bearings are bronze or iron, we're with you. And here are other

Columbia-Made Specialties:

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Armature and axle straighteners
Armature buggies and stands
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Coil taping machines for armature leads
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Signal or target switches
Tension stands

CAR EQUIPMENT

Armature and field coils
Brush-holders and brush-holder springs
Brake, door and other handles
Brake forgings, rigging, etc.
Car trimmings
Commutators
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Forgings of all kinds
Gear cases (steel or mall. iron)
Grid resistors
Third-rail contact-shoes and accessories
Trolley poles (steel) and wheels

Columbia Machine Works & Malleable Iron Co.

Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

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Havana Electric Railway Light & Power Co.

has equipped its new power plant in Havana entirely with

Drouvé Sash Operators

(Lovell Improved Dreadnaught Type)

—about 10,000 lineal feet, both monitors and side-walls. This is only one of many large electric railways that has investigated, compared, chosen and specified Drouvé Sash Operators—both Lovell and "Straight-Push" types. Simple, strong and sturdy. Practical and permanent. "Built to stand the kind of use they get."

Send for list of installations

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IF YOU WANT PROOFS

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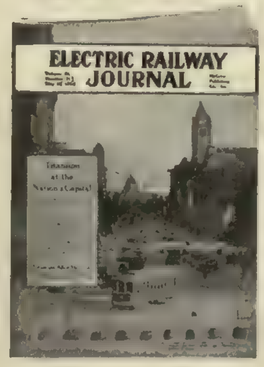
Copy Must Be in Our Hands Two Weeks in Advance of Publication Date

Copy Changes. If no proofs are desired your advertisements should be in our hands Wednesday of the week preceding date of publication, otherwise your latest advertisement in accordance with schedule will be repeated.

New Advertisements (not changes of copy) can usually be accepted up to noon Wednesday of the week of publication, but no guarantee can be given as to location or proofs or indexing.

Searchlight Advertisements (Proposals, Wants, For Sale, etc.) received as late as 10 A. M. Thursday will be published if there is space available in the pages that go to press last. The paper is dated and mailed Saturday.



ELECTRIC RAILWAY JOURNAL

THESE are not arbitrary rules. We do our best to give our advertisers what they want—work overtime if necessary—but each advertising form has to be on the press at a specified time. That is why we cannot guarantee proof or location unless we have copy on time. We want our advertising space to work at maximum efficiency for our advertisers.

The Paper is dated and mailed Saturday

Electric Railway Journal, 239 W. 39th St., New York

TROLLEY WIRE

Round Grooved and Figure 8

If you will agree that one make of trolley wire is able to give longer service than another make—

That one is more economical than another—

Then investigate our trolley wire with a view to cutting your wire costs.

STAR BRAND
Made to Wear, To Wear Well
WEATHER-PROOF WIRE

Weatherproof Wires and Cables

Star Brand

Star Brand Wires are made with long service as the most prominent feature.

Because of their ability to render long service they cut wire costs.

Read the words in the cut of the star.

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CINCINNATI: Traction Building
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The STANDARD for RUBBER INSULATION

Railway Feed Wires insulated with OKONITE are unequalled for flexibility, durability, and efficiency, and are in use by the leading Electric Street Railway Companies. OKONITE is preferred above any other insulation for Car Wiring, Telegraph and Telephone Purposes.

OKONITE WIRES—OKONITE TAPE—MANSON TAPE—CANDEE WEATHERPROOF WIRES—CANDEE PATENTED POTHEADS.

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THE OKONITE COMPANY, 253 Broadway, New York

CENTRAL ELECTRIC CO., Chicago, Ill., General Western Agents

F. D. Lawrence Electric Co., Cincinnati, O.
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Spells Safety

Type N 3-indication light signals for spacing trains on double track at 50 m. p. h.

RED, ***Stop.*** **YELLOW,** ***Proceed under control, prepared to stop at next signal.*** **GREEN,** ***Proceed.***

NACHOD SIGNAL CO., INC.

4777 Louisville Avenue, Louisville, Ky.

You Can Minimize Overhead Repair Work

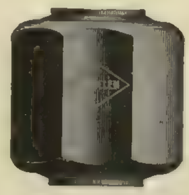
and successfully cut maintenance costs if you turn to

The Macallen Line

of strain insulators, hangers, splicing ears, crossings, and other overhead material.

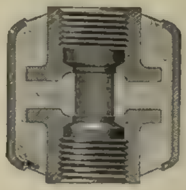
They are "specialty" products, designed and built to make "Macallen" the standard on American railways.

It will pay you to write for information and prices.



The Macallen Insulating Joint

Adopted by principal air brake manufacturers as part of their standard equipment. Also insulates steam pipes, etc. Shell is seamless drawn steel, nipples are machined from steel rod, and insulating material is Macallen Vulcanite Compound, not affected by heat or oil—practically indestructible.



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The Macallen Company

Macallen and Foundry Sts., Boston

TRADE MACALLEN MARK

Established 1858

BARBOUR, STOCKWELL CO.

SPECIAL WORK

CURVES

TURNOUTS

CAMBRIDGE, MASS.

Superior Switches Mates and Frogs

Accessories of Every Description

Turnouts Crossings and Kerwin Portable Crossovers

Solid Manganese Steel and Insert Work

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Estimates Promptly Furnished

This 600-Volt Type "P"

ANDERSON

Time Switch Will Handle Your Lights

at interurban stations and city transfer points—positively—accurately—without the least trouble—at minimum expense.

Every bit as strong and trustworthy and sturdy as all the other time switches in the Anderson line, it is peculiarly adapted to electric railway needs, and handles 600 volts perfectly.

Bulletin No. 33 contains detailed description—write for your copy.

Albert & J. M. Anderson Mfg. Co.

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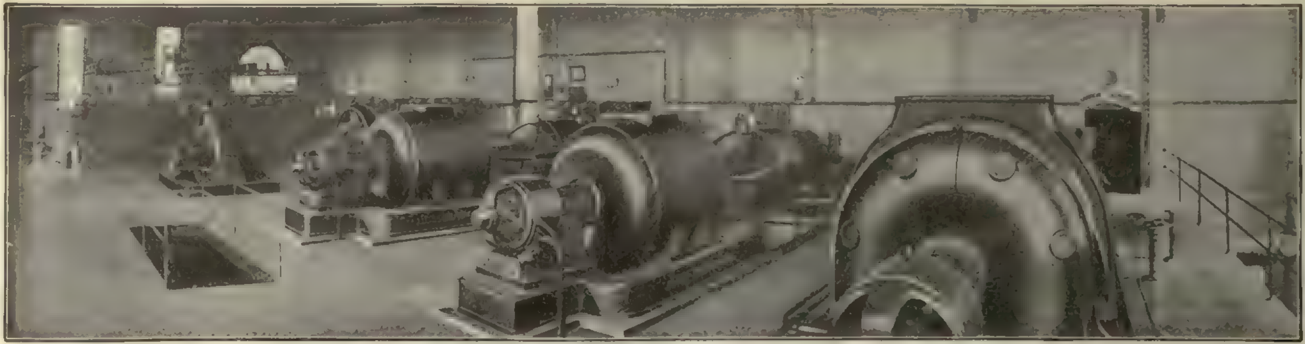
BRANCHES:—New York, 135 Broadway London, 48 Milton Street

Chicago, 105 So. Dearborn St. Philadelphia, 429 Real Estate Trust Bldg.



A Modern Interurban Power Station

Completely Equipped With

Allis-Chalmers Power and Electrical Machinery

Under an Allis-Chalmers contract you may purchase a single generator or prime mover, a complete electric unit or your entire power and electrical equipment.

Any type of prime mover may be included—Steam Turbine, Steam Engine, Gas Engine, Oil Engine or Water Wheel. Complete Units are built in the same shops and under the same supervision.

Such a contract with its undivided responsibility necessarily means responsible supervision, a guarantee of completeness as well as a saving in expense.

Let Us Figure on *Your* Equipment

Allis-Chalmers Manufacturing Company, Milwaukee, Wisconsin
Offices in All Principal Cities
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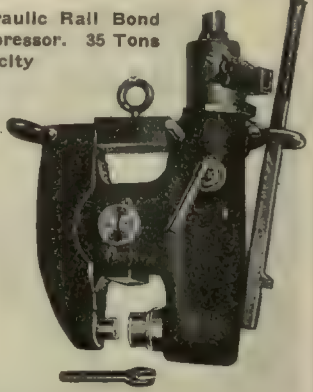
HYDRAULIC TOOLS
FOR
TRACK MAINTENANCE



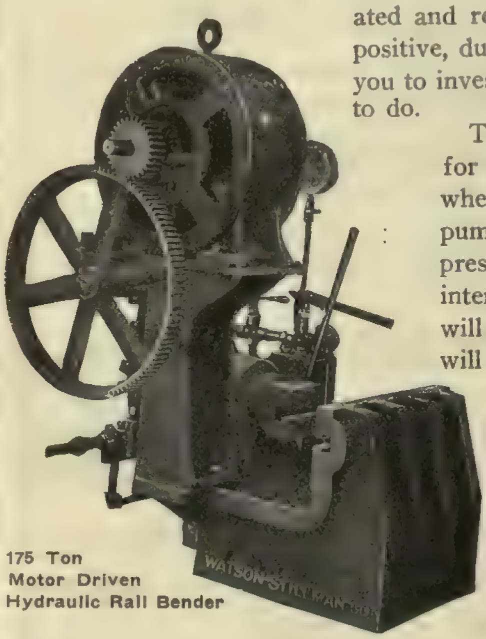
Hydraulic Rail Bond Compressor. 35 Tons Capacity

Here Are Two That Every Electric Railway Needs.

This **RAIL BOND COMPRESSOR** tool does excellent work wherever used. It requires little space, may be placed, operated and removed in the shortest possible time, is positive, durable and efficient. It will certainly pay you to investigate this tool if you have any bonding to do.

This is a very economical **Rail Bender** for use where electric power is available and where much bending is done. It has a 3½ H.P. motor; two plunger pump, and a capacity of 175 tons. We also make hydraulic jacks, presses, punches, pumps, wheel presses, shear bulldozers, accumulators, intensifiers, motor lifts, etc. If your needs are special our engineers will gladly advise as to construction and cost of a special machine. We will give your inquiry immediate and careful attention.

Write for catalogs.



175 Ton Motor Driven Hydraulic Rail Bender

The Watson-Stillman Co.
46 Church St., New York

W-S HYDRAULIC

Chicago, McCormick Bldg.
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St. Louis, Corby Supply Co.

W-S HYDRAULIC

273

Of course we're proud of the

Ford Tribloc

CHAIN HOIST

for our customers tell us that it is safer and easier running and enables them to handle work more quickly than with any other hoist they have used.

There are many good reasons for their claims:

The Tribloc's parts are few in number and simple in design; all working parts which support the load are made of steel, thereby increasing the life and strength of the hoist.

All gears are enclosed in a dust-proof steel case.

The Patented Loop Hand-Chain Guide, which enables you to operate the Tribloc at any speed or at any angle, is a part of Standard equipment.

It lowers smoothly and rapidly and holds the load securely.

All chains and hooks are made of drop-forged steel and are thoroughly tested before they are attached.

We have so much faith and pride in the Tribloc that we guarantee it for five years.

Ask for a copy of our Catalog.

Ford of Philadelphia

Ford Chain Block & Manufacturing Company
142 Oxford Street Philadelphia, Pa.

Use

DIXON'S

GRAPHITE BRUSHES

and keep your motors or generators running silently and at maximum efficiency.

Commutator surfaces improve under the action of these brushes.

Losses by friction are thus minimized; and sparking and chattering are avoided.

Upkeep costs are decreased.

Our electrical service department is at your command.

Write for
Graphite Brush Booklet No. 108-M

Made in JERSEY CITY, N. J., by the

Joseph Dixon Crucible Company

Established 1827

M-28

You can Handle the J-M with One Hand if you have to

$8.00 Brass or Nickel finish. Bracket included

Look for the most awkward corner, the most inaccessible point around the plant, and ask yourself—"If a fire started there would I have room enough to work an extinguisher?"

With the J-M Extinguisher you can do all the pumping where there is elbow room, then go into the tightest corner and with the air pressure thus stored up, shoot a steady stream into the fire. Or where room permits, you can pump and aim at the same time. The J-M is the only extinguisher that gives you this choice of operation.

Effective against any incipient fire, including oil, grease, gasoline and electric arc.

Inspected, tested and labeled by the Underwriters' Laboratories, Inc., and included in the list of approved fire appliances issued by the National Board of Fire Underwriters.

The J-M Extinguisher Fluid for recharging is sold in quart cans bearing the J-M Seal. This liquid is non-deteriorating and a non-conductor. Obtainable from all dealers who handle this extinguisher.

Serves more people in more ways than any other Institution of its kind in the world.

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COVERS THE CONTINENT

H. W. JOHNS-MANVILLE CO.

EXECUTIVE OFFICES

296 Madison Ave., New York City

Oxweld Welding Blowpipe.

Keep the Wheels Turning

Idle cars collect no nickels. That's sure.

But did you ever take the time to figure up just how much YOUR company loses while cars wait in shop for repair parts?

Figure your own dead time for the last twelve months and you'll quickly cast about for some means of reducing that loss.

OXWELDING

is the answer. In hundreds of electric railway shops Oxweld Apparatus is making big time and money savings on repair work. They're keeping the cars out on the line—where they can EARN instead of SPEND.

Have you ever investigated "OXWELDING" possibilities in your own business? Do you know how much time and money it will save you in repairing broken castings and forgings—in bonding and track work?

We have collected all the facts and figures to make it easy for you. Bulletin Series 700-J is bound to interest you because it shows you how to save money. It's free for the asking.

Oxweld Acetylene Company

Largest Makers of Welding and Cutting Apparatus in the United States

Newark, N. J. Chicago Los Angeles

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Where the Standard of Grinding Quality is High

the selection of grinding wheels is made strictly on demonstrated merit. Where machine parts must be finished to a fine degree and exact size—where costs must be kept down and production increased—much depends upon the wheel selection. The general use of

NORTON GRINDING WHEELS

wherever the choice of the wheel is made upon the basis of efficiency, shows that

The Norton Limit is the Grinding Limit

ALUNDUM for steel and steel alloys.
CRYSTOLON for cast iron, brass, bronze, etc.

NORTON COMPANY
Worcester, Mass.
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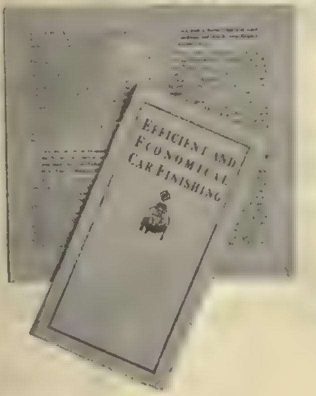
Efficient and Economical Car Finishing

Tear Out and Mail This Coupon Today

It will tell you how to obtain Efficiency and Economy in your Paint Shop

Here is a booklet that furnishes general information regarding The Sherwin-Williams Modern Method Car Painting System. It will acquaint those interested in efficient car painting with the advantages to be derived through its use.

Modern Method Car Painting System eliminates all unnecessary labor and the use of excessive material, and brings about the best results in service, with a minimum expense for labor and material.

SW COVER THE EARTH

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Railway Paints and Varnishes
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THE SHERWIN-WILLIAMS CO.

Gentlemen:
Please mail without obligation to me your book which will explain efficient and economical car finishing

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Bayonne Car Roofing
Saves on This Item—

Only one color coat is necessary after installation. This is due to the thorough automatic rot-proof and weather-proof impregnation given at our plant—an impregnation which staves off decay and adds years to the life of the roof in much the same way as creosote treatment adds to the useful life of your poles and ties.

And, beside this worth-while saving in painting cost, consider the wonderful economy of maintenance—for Bayonne Roofing lasts, and lasts, and lasts. Shall we send samples?

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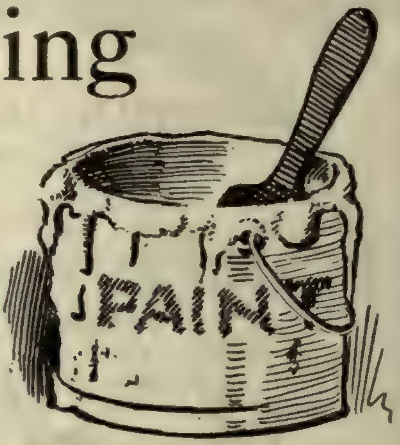

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Tape Security is Possible

Why not guard your equipment against attack? An easy and quick way to fortify is to specify any of our

Dependable Brands

Protection where high voltage wires interlace requires extra defensive measures

THE MECHANICAL RUBBER COMPANY
CLEVELAND

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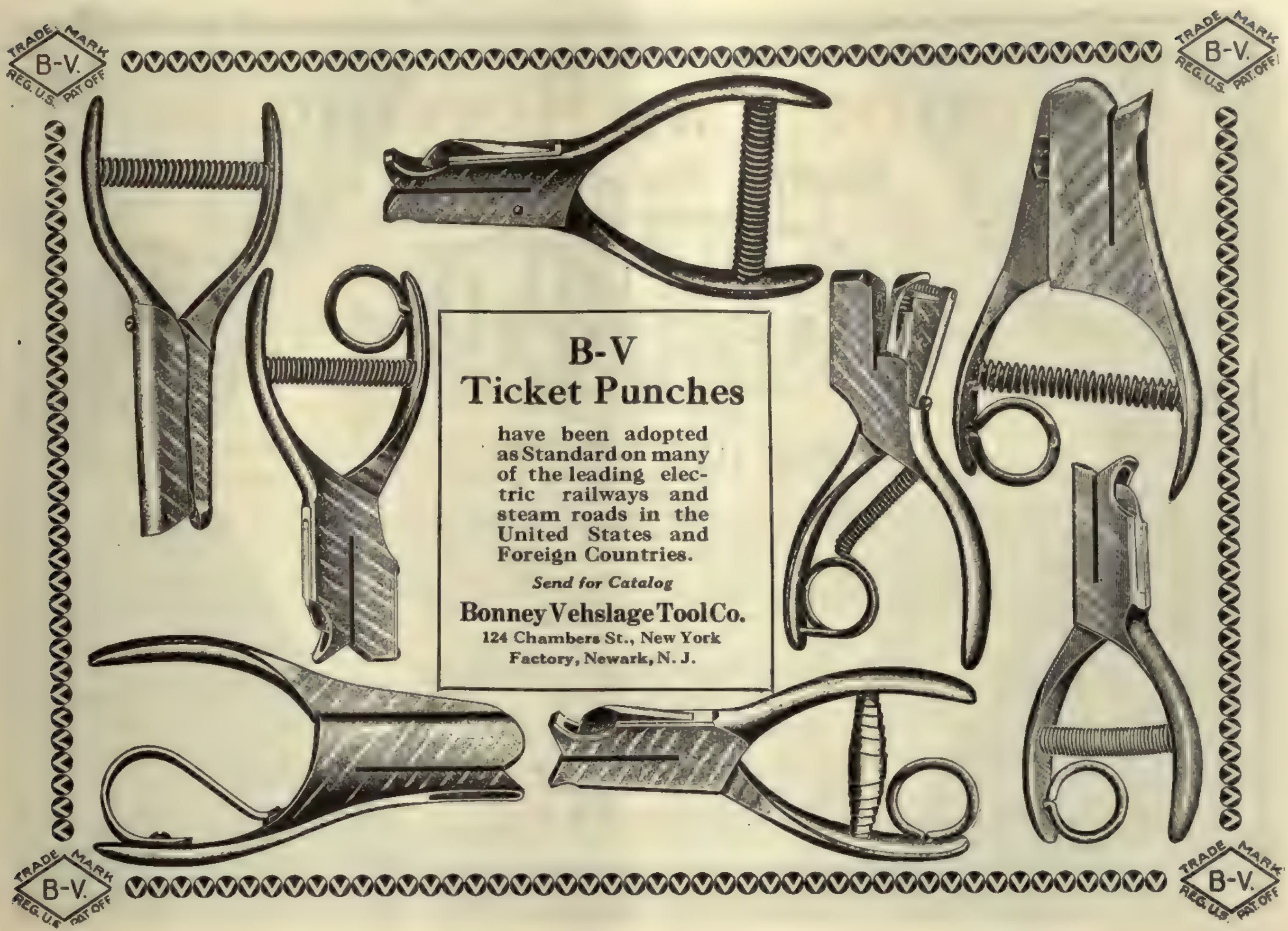

B-V
Ticket Punches

have been adopted as Standard on many of the leading electric railways and steam roads in the United States and Foreign Countries.

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124 Chambers St., New York
Factory, Newark, N. J.

Auditing Expenses are Lower

Because the complete record afforded by the Bonham Traffic Recorder needs no compilation or checking. It is ready to be placed on your company's books.

BONHAM Traffic Recorders

keep tab on the traffic while on the road. They do away with the need for elaborate computations. When a Public Service Commission calls on you for data as to "Earnings per Passenger Mile," YOU HAVE THE FACTS—if your cars are BONHAM-Equipped.

The Bonham Recorder not only records cash but it keeps tab on passenger-mileage—the unit needed in computing operating costs and earnings.

Write for the Illustrated Book "Earnings Per Passenger Mile."

THE BONHAM RECORDER CO.
Hamilton, Ohio, U. S. A.

Why Electric Railways Use

DU PONT FABRIKOID

REG. U. S. PAT. OFF.

FOR CAR SEATING

Because
It is SANITARY, COMFORTABLE and SERVICEABLE.

It does not split nor crack.

It is impervious to water, and can be cleansed with soap and water when necessary.

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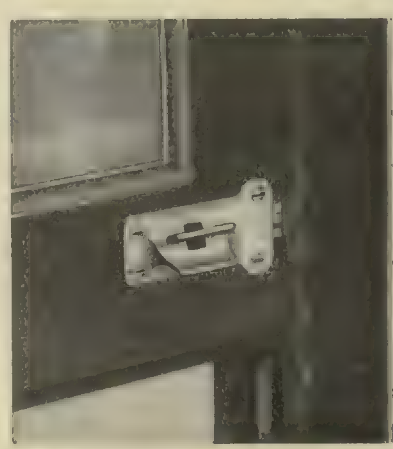
Wilmington, Delaware

Wendell & MacDuffie Company
Railroad Department Representatives
61 Broadway, New York, N. Y.

The Lehigh Valley Transit Co.'s New Center-Entrance Interurbans

are equipped with

EDWARDS Sash Fixtures



These cars, just delivered by the Southern shops, are the finest pieces of rolling stock on the Liberty Bell Route. Every detail of equipment was selected with an eye to the comfort and protection of passengers—so "Edwards" was written into the sash fixture specifications.

The Edwards Sash Fixture Catalog will assist you in selecting fixtures for new or old cars. Write for your copy.

The O. M. Edwards Co., Inc. Syracuse, N. Y.

Window Fixtures
Top, Bottom and Side Weather Stripping
Metal top Casings

Metal Extension Platform Trap Doors
All-Metal Sash Balances and Shade Rollers
Railway Devices

Why Not Now?

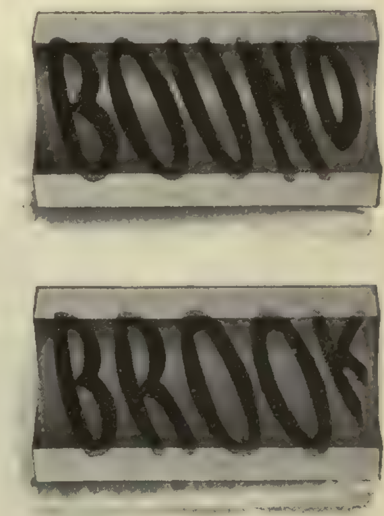
Sooner or later, sound business judgment is going to lead you to equip every trolley wheel on your line with

"Bound Brook" Bushings

Do it at once—and watch the delays and troubles disappear.

With over two million sold last year, and this year's sales already crowding the two-million mark, there must be a reason. Ask us.

All genuine graphited "Oil-Less" Bearings have always been made at Bound Brook, N. J., in the United States of America, by the



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Bound Brook Oil-less Bearing Co.

Formerly Graphite Lubricating Co.

For High Speed Operation

—Large Diameter Kalamazoo Trolley Wheels

As a solution to arcing and short wheel life on high speed electric railway work, two new Kalamazoo Wheels have been designed.

They are (No. 20) 11½ inches and (No. 21) 10 inches in diameter. An ample increase of width, depth of groove and length of hub insures a well-balanced wheel in each case.

Tests covering considerable mileage at high speeds show that these two new "Kalamazoos" greatly decrease sparking, while offering longer wheel life. There is more bearing on the wire, with consequent greater contact and current carrying capacity.

The patented Kalamazoo Harps have been enlarged to carry these wheels.

Try several on your lines. Compare their service with that of smaller wheels.

Write Today.

STAR BRASS WORKS

KALAMAZOO, MICHIGAN

ENDURANCE

finds its most artistic manifestation in the temples of ancient Greece—its most practical manifestation in

"Le Carbone" Carbon Brushes

To use them is to terminate a host of brush troubles. They are Efficient—Economical—Uniform. It is never too soon to begin using them.

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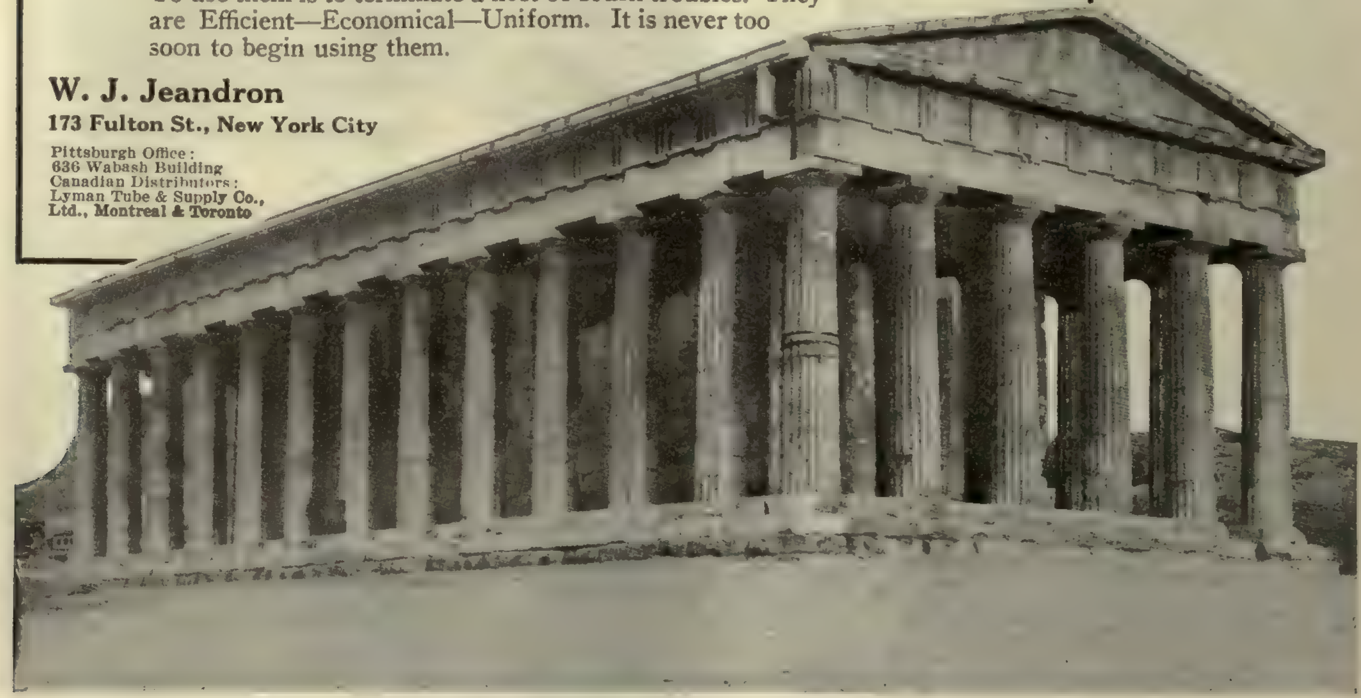
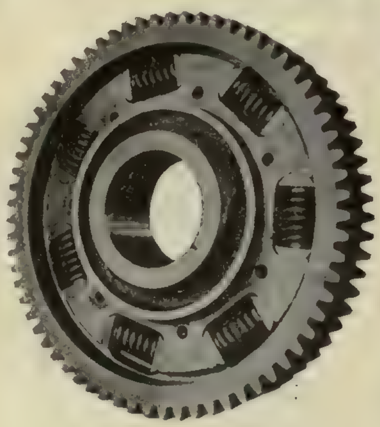




Flexible Gear; Cover plate removed.

FLEXIBLE GEARS

For Heavy Service

They absorb shocks due to rough track, brake applications, power applications, motor characteristics or any other cause.

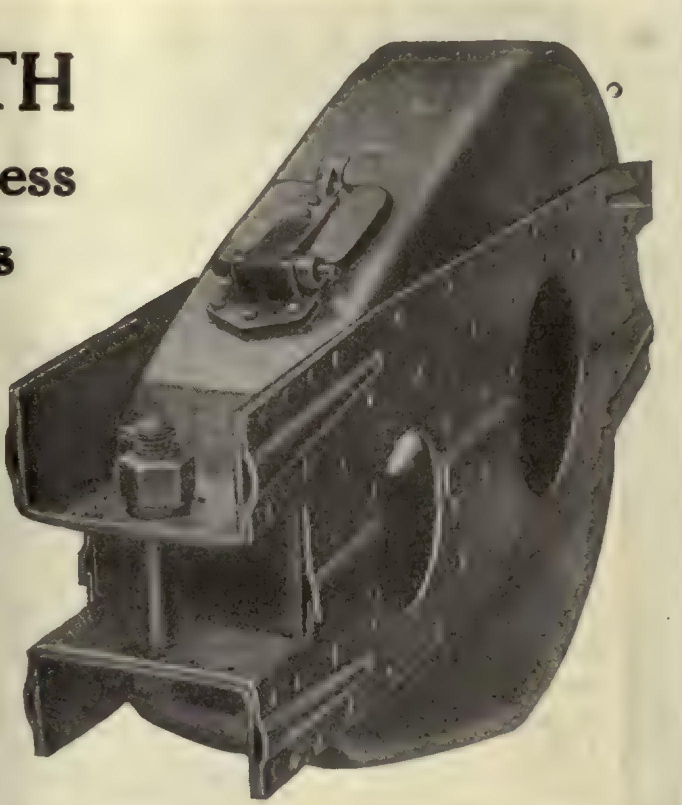
They prolong life of bearings, commutators, brushes, brush rigging, armature windings and insulation, truck framing and running gear.

The centers, springs, cover plate, etc., are permanent and the high grade rims renewable. All internal wearing parts case hardened and ground.

They will solve your heavy service gear problem

NUTTALL - - - - PITTSBURGH

CHILLINGWORTH
Drawn Steel Seamless and Rivetless Cases



Are Much Lighter

than malleable iron gear cases. In fact, the saving in weight is about 40%—and this also saves a proportionate amount in cost.

When it is remembered that the cost of hauling each pound of car-weight is about 5 cents per year, the savings which can be effected by using Chillingworth Cases should not be ignored.

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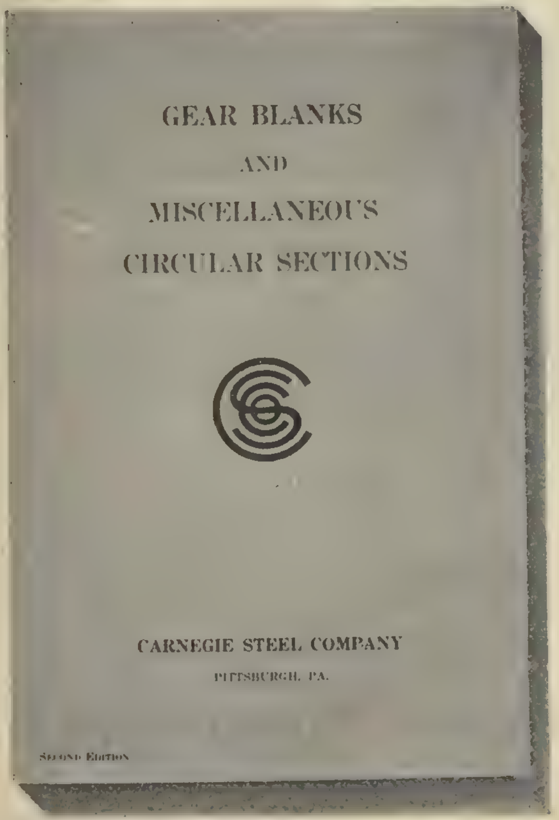

GEAR BLANKS
AND
MISCELLANEOUS
CIRCULAR SECTIONS

CARNEGIE STEEL COMPANY
PITTSBURGH, PA.

SECOND EDITION

If anxious to improve the character of your gears or to obtain better wearing quality in other circular sections, ask for this book.

In addition to the sections shown therein, this company will be pleased to consider the making of any similar products.

Carnegie Steel Company
General Offices—Pittsburgh, Pa.

793

The demand for our material is so great that we earnestly recommend our customers to anticipate their needs as much as possible.

STANDARD STEEL WORKS CO.
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Chicago
St. Louis
Pittsburgh
San Francisco
Richmond
Portland
Havana, Cuba
London, Eng.
Melbourne, Aust.
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"The Brakes Didn't Hold Her!"

"I saw the farmer's wagon on the crossing ahead—gave the 'two long and two short' on the whistle—then noticed the horse was balky, so I began to feed her the air.

"Gave her a good lung full, when 'SNAP' goes something underneath—and we banged into the wagon."

Many an accident—more or less distressing than this one—has been caused by the wearing-off or shearing-off of pins in the brake-rigging, accidents which could be prevented by the use of

Boyerized Pins

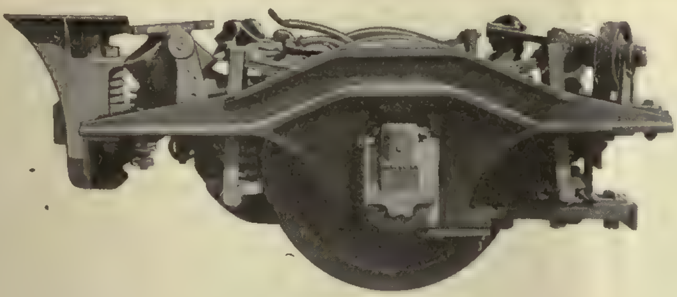
Boyerized Pins mean *safety* because they are *case-hardened*—they mean economy because they save the time and money involved in renewal of ordinary steel pins.

Boyerized Pins average 300,000 miles—or 2½ years—of absolutely safe life.

Of course you believe in "safety first"—then Boyerize your brake rigging right away. We are ready to show you the small cost and the big results. Write today.

Bemis Car Truck Co.
Springfield, Mass.

A New Baldwin Truck



Baldwin Truck, Class 14-P. Built for Binghamton Ry. Co.

Under favorable conditions, important economies result from mounting light and medium weight cars on four wheels instead of eight. The Baldwin Class "P" truck meets such conditions. This truck has a limited amount of radial motion. The outer ends of the car body are supported on rollers, while the intermediate supports are in the form of swing links, which act as a truck centering device. A combination of half-elliptic and coil springs absorbs shocks while running and insures easy riding.

Consider the Baldwin Class "P" truck for use under your new city service cars. Further particulars will be furnished on request.

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Philadelphia, Pa.

REPRESENTED BY

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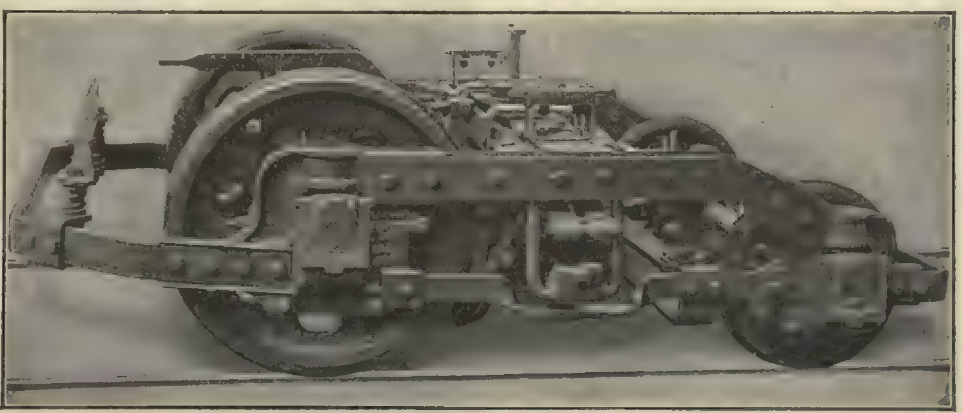
TAYLOR MAXIMUM TRACTION TRUCK



12 FACTS REGARDING "TAYLOR-MADE" TRUCKS

ABSOLUTELY SAFE
RIDE LIKE PULLMANS
SIMPLE IN CONSTRUCTION
REDUCE WEAR OF MOTORS
WILL INCREASE DIVIDENDS
REDUCE COST OF MAINTENANCE

SAVE POWER
SAVE ROAD BED
LIGHT IN WEIGHT
OVERCOME FLANGE WEAR
BRAKES DO NOT CHATTER
PREVENT SIDE OSCILLATION OF CARS

TAYLOR ELECTRIC TRUCK CO.
Established 1892
TROY, N. Y.

SPECIFICATIONS ON REQUEST

SEND FOR PORT-FOLIO

The Car Rider's Car

PROOFS — figures — data — these are the only things that really back up statements, and they are almost always asked for. In fact, it might be a good rule to avoid the proposition, which has no statistical proof back of it. With this in mind close observations have been made of the Car Rider's Car in actual operation. In Cleveland there is a line which serves all prominent hotels and the railroad station, and on this line Car Rider's Cars have been in operation. The passengers who board the cars on this line are either persons who request transfers from the conductor or persons who are strangers in Cleveland and who ask questions of him, these questions varying, of course, in nature and in time consumed in answering them. Observation has shown that fully fifty per cent of the passengers take transfers and the resultant handicap against swift loading is obvious. In addition, the very large majority of the passengers who board the cars at the station have in their hands at least one, sometimes two, pieces of baggage. And yet, even under such adverse operating conditions, cars on this line have established an average of fifty passengers unloaded and fifty passengers taken on in less than fifty seconds. One especially noteworthy indication of the efficiency of the car's arrangement was the loading of seventy passengers at the station (almost without exception they were laden with luggage) in exactly fifty-seven seconds. Add to this unquestionably good performance with a two-man crew the fact that the Car Rider's Car may be operated during in-between times by one man, simply by closing the center doors and moving the farebox up to the motorman's station, and the all-around efficiency of the car and its remarkable flexibility, are demonstrated clearly.

PETER WITT, 630 Leader Building, CLEVELAND

Recent shipment of semi-steel trailer cars for Salt Lake & Ogden Railway

THE JEWETT CAR COMPANY
Newark, Ohio

Permanent Overhead Construction

If you find it necessary to rebuild your interurban overhead construction on account of the decay of your wooden poles, write us and we will give you an estimate as to what permanent reconstruction would cost you.

Archbold-Brady Company
Engineers and Contractors
Syracuse, N. Y.

STEEL POLES For every pole purpose

Bates Steel Poles in use by the DES MOINES CITY RAILWAY, Des Moines, Iowa, U. S. A.

Strongest STEEL POLE of like weight in the world.
Best STEEL POLE in the world for electric railway trolley service.
Most artistic STEEL POLE in the world for any service.
We make the lowest prices.
We have constantly on hand about two thousand tons of steel and can make immediate shipments.
A full line of convenient malleable fittings.
Our steel pole TREATISE tells a big story, ask for it.

BATES EXPANDED STEEL TRUSS CO.
208 South La Salle St., Chicago, Ill., U. S. A.

No. 72—10000 Volts

An Assurance of Uninterrupted Service

is best secured by a careful selection of the transmission line insulators. It is here that breakdowns are most likely to occur.

Hemingray Insulators

by reason of their continued use on important transmission lines have demonstrated the soundness of Hemingray design. The teats on the petticoat attract water on the outer and inner surfaces into drops—preventing the creeping of moisture on insulators and pins. The line is complete and the catalog shows it. Have you a copy?

Hemingray Glass Company
Established 1848 } *Covington, Ky.*
Incorporated 1870
Factories: MUNCIE, INDIANA

No. 20—5000 Volts

ALUMINUM
Railway Feeders
And all kinds of **Electrical Conductors**

Aluminum feeders are less than one-half the weight of copper feeders and are of equal conductivity and strength. If insulated wire or cable is required, high-grade insulation is guaranteed. Write for prices and full information.

Aluminum Company of America
Pittsburgh, Pa.

ELECTRICAL WIRES and CABLES OF EVERY DESCRIPTION

Aerial Cables
Annunciator Wire
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Automobile Lighting Cables
Automobile Starter Cables
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Armature Coils
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Bare Copper Strands
Copper Wire Bare
Cambric Cables
Fixture Wire
Fire and Weatherproof Wire
Field Coils
Lamp Cord
Moving Picture Cord
Mining Machine Cables
Magnet Wire
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Power Cable, Cambric Insulated
Power Cable, Paper Insulated
Slow Burning Wire
Telephone Cable, Paper Insulation
Telephone Cable, Rubber Insulation
Weatherproof Wire

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Western "Good Poles Quick" Northern
Quick Shipments from our Minneapolis Yard
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Spokane - St. Louis
Butt Treating Open Tank and "Hot and Cold" Processes

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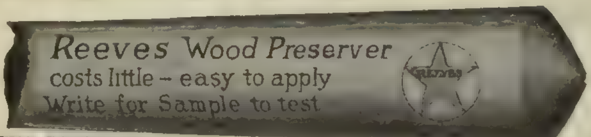

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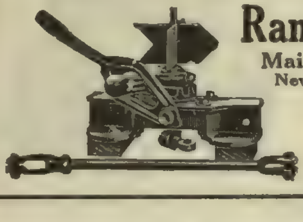

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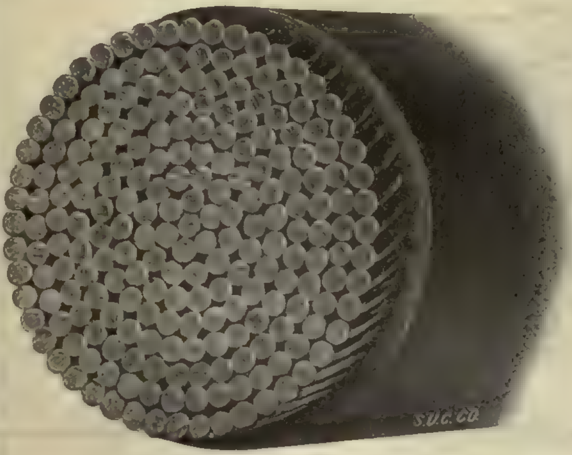

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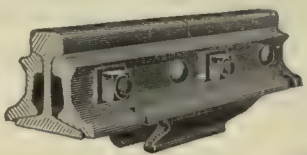

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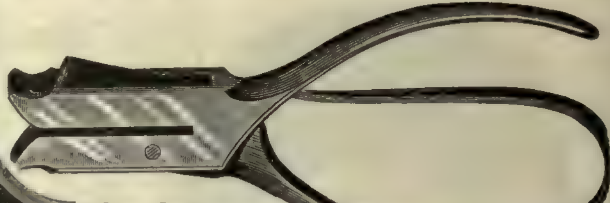

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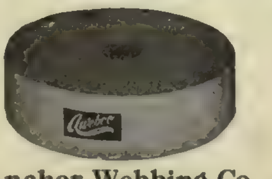

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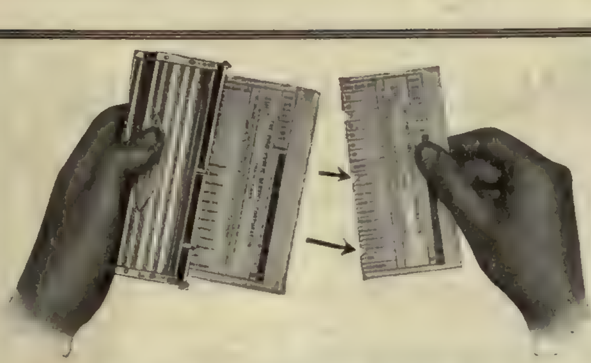

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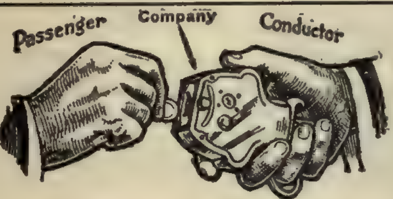

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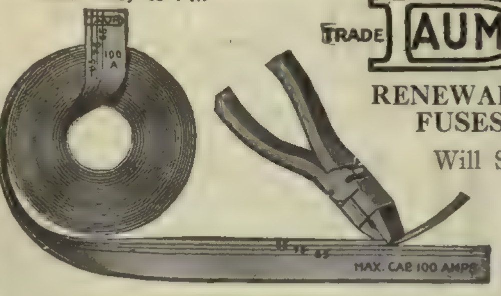

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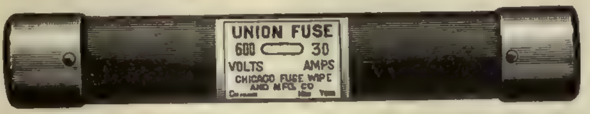

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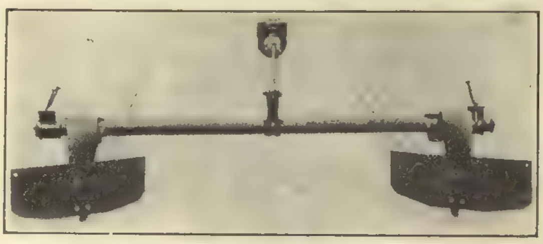

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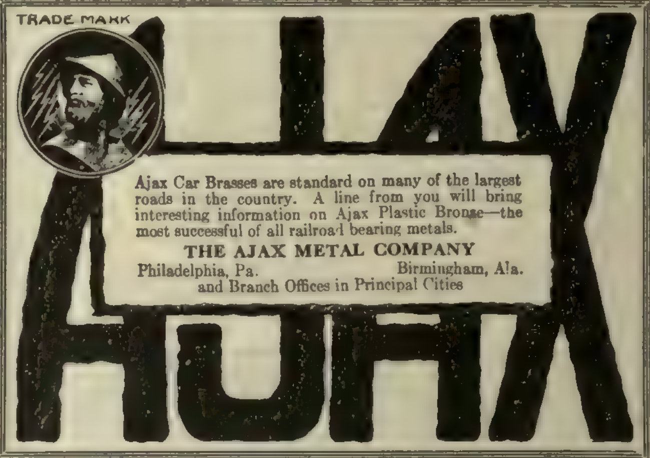
Missouri Trust Bldg., St. Louis, Mo.



Ajax Car Brasses are standard on many of the largest roads in the country. A line from you will bring interesting information on Ajax Plastic Bronze—the most successful of all railroad bearing metals.

THE AJAX METAL COMPANY
Philadelphia, Pa. Birmingham, Ala.
and Branch Offices in Principal Cities

Wheel Condition No. 1

When only the inner portion of the tread needs grinding — here's the style of

Pat. May 31, 1898; Sept. 1, 1903; Aug. 2, 1904; Dec. 29, 1908; June 15, 1909; April 21, 1914.

WHEEL TRUING BRAKE SHOE

that will correct the difficulty without removing the car from service. We have a shoe to fit any style of head any sized wheel.

Wheel Truing Brake Shoe Co.
DETROIT MICHIGAN

S-W Shim Slack Adjusters Save Brakeshoes and Labor

SMITH-WARD BRAKE COMPANY, Inc.
17 Battery Place, New York

Do You Want a Salesman or Other Assistant?

If so, send us copy for a card under "Positions Vacant" in the Searchlight Section. The cost will be slight and the result will be both quick and satisfactory.

Get your Wants into the Searchlight
ELECTRIC RAILWAY JOURNAL, 239 West 39th St., New York

The St. Louis
Car Company

QUALITY SHOPS

8000 N. Broadway
St. Louis

THE
CINCINNATI
CAR
COMPANY

WORKS:
WINTON PLACE
CINCINNATI, OHIO

Frozen Air?

can you afford to have

Cars out of service? "Pull-ins" which are expensive? Blockades of several cars from one in trouble? Alcohol used in large quantities after troubles occur? Flat wheels due to failure to release? Valves clogged with gum?

Radiating piping and extra reservoirs, which are expensive and heavy, do not prevent the formation of frost in brake systems, one reason being that

WHEN AIR IS APPLIED TO
THE BRAKE CYLINDER WHILE
THE COMPRESSOR IS WORKING

only a portion of the moisture is caught in these receptacles, the balance passing on through them.

The automatic, efficient and economical admixture of denatured alcohol with the moist air by means of our

AIR RECTIFIER

is the logical solution.

Save the expense, weight and space required for reservoirs and piping.

National Safety Device & Mfg. Co.
2415 Smalley Court Chicago, Ill.
Eastern Electric Railway Agent,
LORD MANUFACTURING CO., NEW YORK.

15%
Energy Reduction
Is but One Saving

Rollway Bearings accomplish. Not only do they eliminate friction in truck bearings to permit more coasting, but they save enough on lubrication and carhouse labor to make the change a good investment.

Write for the facts to

The Railway
Roller Bearing Co.
Syracuse, N. Y.

SEARCHLIGHT SECTION

For Sale

Three Miles,
More or Less,
of 500,000

Circular Mill Cable

Insulation Good

Will be sold to highest bidder.

Telegraph

Charles F. Speed
Evanston Railway Company
Evanston, Illinois

200 Kilowatt 60 Cycle Rotary Converters

2—200 KW. Westinghouse, 3 ph., 60 cy. rotary converters, 370 v. A. C., 575 v. D. C., 720 rpm., with starting motors, also transformers if desired.

150 Kilowatt 60 Cycle Rotary Converters

2—150 KW. Westinghouse 3 phase, 60 cycle rotary converters, 550 volts, 273 amps., 720 r.p.m., complete with 4—100 KW. Westinghouse Scott connected oil insulated transformers, 10,000/9500 volts prim., 430/362 volts secy.

150 Kilowatt 25 Cycle Rotary Converters

2—150 KW. General Electric type T. C., 4-150-750, 25 cycle, 3 phase, 575 volt, rotary converters, 750 r.p.m., complete with end play and speed limit device.

Railway Motors

2—75 to 90 HP. Westinghouse No. 112 Railway Motors, newly rewound, practically new.

IMMEDIATE DELIVERY

ARCHER & BALDWIN
114-118 Liberty Street New York City
TELEPHONE 4337-4338 RECTOR

MACGOVERN AND COMPANY
INC.
FRANK MACGOVERN, Pres. & Gen. Mgr.
114 LIBERTY STREET NEW YORK CITY
'Phone, 3375-3376 Rector

60 CYCLE ROTARY CONVERTERS

1 1000 KW. Gen. Elec., type HC, form P, 6 phase, 1667 amps., 600 volts D.C., 360 R.P.M.
2 300 KW. Gen. Elec., type HC, form P, 6 phase, 500 amps., 550 volts D.C., 900 R.P.M., with end play and speed limit device.
1 200 KW. Westinghouse, 3 phase, 600 volts D.C., 900 R.P.M., with starting motor.

550 VOLT DIRECT CURRENT UNIT

300 KW. Westinghouse, 550 volt, 145 R.P.M., dir. conn. to 16½" and 30½" x 30" Buckeye tandem engine.

Immediate Delivery

THIS IS OF NECESSITY ONLY A PARTIAL LIST—
SEND FOR CATALOG

CARS FOR SALE
OPEN and CLOSED
MOTOR and TRAIL
Write for Price and Full Particulars to
ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

COMPLETE ARMATURES FOR SALE
FOR ALL THE STANDARD
STREET RAILWAY MOTORS
GET OUR PRICE WE CAN SAVE YOU MONEY
America's Greatest Repair Works
CLEVELAND ARMATURE WORKS, Cleveland, O.

Undisplayed
Cards Under
Positions Wanted
Cost 50 Cents
for 25 Words

Keep Your Eyes on the Journal's Searchlight Section

Machinery
Advertisements
Undisplayed
Cost $1.50
for 50 Words

SEARCHLIGHT SECTION

Get your Wants into the Searchlight

ADVERTISING RATES

Under "Positions Wanted," including Salesmen looking for new connections, Evening Work Wanted, Side Line Wanted, etc., undisplayed advertisements cost **two cents a word,** minimum charge 50 cents an insertion, **payable in advance.**

Under "Positions Vacant," including Agents and Agencies Wanted, Representatives Wanted, Salesmen Wanted, Partners Wanted, Desk Room Wanted or For Rent, Business Opportunities, Employment Agencies, and Miscellaneous For Sale, For Rent, and Want ads; also Auction Notices, Receivers' Sales, Machinery and Plants For Sale or Wanted (with one line of display heading), undisplayed advertisements cost **three cents a word,** minimum charge $1.50 an insertion.

If replies are in care of any of our offices, allow five words for the address.

All advertisements for bids (Proposals) cost $2.40 an inch.

ADVERTISEMENTS IN DISPLAY TYPE

cost as follows for single insertions:

1/16 p. (1⅛x3⅜ ins.)	$5.00	1 in. (1x2 3/16 ins.)	$3.00
⅛ p. (2⅜x3⅜ ins.)	10.00	4 inches (4x2 3/16 ins.)	11.60
¼ p. (5x3⅜ or 2⅜x7 ins.)	20.00	8 inches (8x2 3/16 ins.)	22.40
½ p. (10¼x3⅜ or 5x7 ins.)	40.00	15 inches	40.50

1 page (10¼x7 ins.) 30 inches....$80.00

For space to be used within one year, to be divided to suit requirements of advertiser, provided some space is used in each issue following first insertion:

1 page	$80 a page	18 pages	$56 a page
3 pages	72 a page	26 pages	53 a page
6 pages	64 a page	40 pages	52 a page
12 pages	58 a page	52 pages	50 a page

In replying to advertisements, do NOT enclose original testimonials, drawings or photographs that you may want returned. Advertisements for men often produce several hundred applications and no employer can be expected to read all of these carefully and return the papers or applications of those in which he is not interested. State your experience and qualifications in as concise and neat a manner as possible and enclose COPIES of your testimonials.

When advertising machinery, use your own name and address—or a local address of some kind—so that the readers can wire direct and get quick replies. We advise also that you state in your advertisement the present location of plant that is offered for sale, or point of delivery provided you are in the market for equipment.

FOR SALE

Wire for Sale

Eight thousand pounds of No. 3 asbestos and single cotton covered magnet wire, manufactured by Electric Cable Co. On original reels and in perfect condition. If interested write W. H. Smaw, Pur. Agt. Georgia Ry. & Power Co., Atlanta, Ga.

A Metal Opportunity

Take advantage of the high prices of metal We are cash buyers of all grades of scrap metal. Our specialty is buying electric plants, storage battery plants, storage battery plates and sediment. We buy small lots as well as large lots. Write us and tell us what you have and we will be pleased to quote you prices. National Metal & Rubber Co., 30-31 India Wharf, Boston, Mass.

Generating Set for Sale

1—300 hp. Buckeye tandem compound engine 14¼" and 25 x 21", 20" stroke, 200 r.p.m., non-condensing, capable of developing 35% in excess of this capacity, direct connected to a 3-phase, 200 kw., 60 cycle General Electric generator. This generating set is in good condition. Immediate shipment can be made. If interested, address Morden Frog & Crossing Works, 208 South La Salle Street, Chicago.

Armature Coil Taping Machine

Saves Time, Labor and Money

A boy can tape 40 coils for Westinghouse 12A Armature in an hour. Further particulars gladly furnished.

Geo. M. Griswold Machine Co.
New Haven, Conn.

RAILS

75 Tons 80 lb.
600 Tons 68 lb.
400 Tons 60 lb.
650 Tons 58 lb.
100 Tons 56 lb.
1200 Tons 52 lb.
50 Tons Girder Rails
20 Tons Flat Rails

OR ANY SECTION—NEW OR RELAY

Before buying
LOCOS., CARS, EQUIPMENT, MACHINERY, TANKS
See what Bargains can be obtained from

ZELNICKER IN ST. LOUIS

423 First Nat. Bk., Chicago
910 Hennen Bldg., New Orleans

MISCELLANEOUS WANTS

Electricians and Armature Winders

Send $1 for 14 blue prints of motor windings, 10 A.C., single, two and three phase and 4 D.C. or set of 20 A.C., 4 D.C. and 4 rotary converter drawings, $1.60. Winding made easy. Martin Elec. Co., 329 Irvington Place, Denver, Colo.

Want Immediately

20 Westinghouse, type 12-A, 30 hp. railway motors, to be in serviceable condition, equipped with armature, axle bearings. Immediate delivery ESSENTIAL. Quote price.

Box 1260, Electric Railway Journal,
1570 Old Colony Bldg., Chicago, Ill.

Trucks Wanted

Street railway company desires to purchase 12 Brill No. 39-E second hand trucks, wheel base 4 ft. 6 in., track gauge 4 ft. 8½ in. Address Box 1270, Elec. Ry. Jour., 935 Real Estate Trust Bldg., Philadelphia, Pa.

POSITIONS WANTED

ELECTRICAL engineering graduate desires position with railway and operating company. Experience in street railway investigations and reports, drafting room, steam engine tests and substation construction. Box 1271, Elec. Ry. Jour., 935 Real Estate Trust Bldg., Philadelphia, Pa.

LINE foreman construction or maintenance, 15 years' experience D.C. and A.C. Catenary construction, good references. Will go anywhere. Married and strictly sober. Box 1257, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

PUBLICITY man, just the kind suggested in the series of publicity editorials now running in this publication is open for new engagement. Experience covers 4 years' publicity writing for big corporation and 6 years of newspaper work. Now in New York State, but willing to locate anywhere. Box 1265, Elec. Ry. Jour.

PURCHASING agent, age 32, married, 10 years with one of the largest street railways in the United States; now filling this capacity in the automobile industry; desires to return to the traction field. Thoroughly familiar with modern purchasing methods. Salary $2,000. Box 1241, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT wants position as Transportation or General Freight and Passenger Agent, or both. Forty-eight years old. Twenty years' experience. Box 1262, Elec. Ry. Jour.

POSITIONS WANTED

SUPERINTENDENT of city and interurban lines, now employed, wishes same position with larger property. Best of reference furnished. Box 1266, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

YOUNG man, six years in executive offices large Eastern street railway and lighting company. Now law clerk legal department. College graduate; member of bar. Can handle legal and claim work. Good assistant to busy executive. Box 1223, Elec. Ry. Jour., 935 Real Estate Trust Bldg., Philadelphia, Pa.

POSITIONS VACANT

A SMALL street railway company in New England States desires a capable working master mechanic. Sixteen passenger cars and four work cars. Pays twenty dollars. State full qualifications with references. P. O. Box 614, Greenfield, Mass.

A LARGE street railway company in the Eastern States desires an operating superintendent to take charge of a division employing 200 blue uniform men. State full qualifications and terms. Replies will be considered in confidence. Box 1251, Elec. Ry. Jour.

A LARGE Eastern electric railway system desires the services of a high grade man to handle public relations and publicity work. State full qualifications and terms. Replies strictly confidential. Box 1252, Elec. Ry. Jour.

ASSISTANT railway superintendent wanted for system operating twelve cars in Southwestern city of 25,000 people. Box 1255, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

EXPERIENCED cost and quotation clerk wanted, electrical supply house. State age, experience, salary. Box 1259, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

GENERAL superintendent wanted for 40 car city road; a man with practical experience and executive ability who has been successful in former positions. Give personal history and business experience. State salaries earned. Box 1256, Elec. Ry. Jour.

MEN wanted by system operating 30 cars. Night car house foreman, also a man of considerable experience in railway operation who can take dictation and be an assistant to the superintendent, also an armature winder. In first letter give full details as to experience, references and salary expected. Box 1272, Elec. Ry. Jour., 935 Real Estate Trust Bldg., Philadelphia, Pa.

SPECIAL track work draftsman wanted. State lowest salary. Address Chief Engineer, The Buda Company, Harvey, Ill.

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

More than 300 different products are here listed. The Alphabetical Index (see eighth page following) gives the page number of each advertisement. As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week. If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will promptly furnish the information.

Acetylene Apparatus. (See Cutting Apparatus, Oxy-Acetylene.)

Acetylene Service.
Oxweld Acetylene Co.
Prest-O-Lite Co., Inc., The.

Advertising, Street Car.
Collier, Inc., Barron G.

Air Rectifiers.
Lord Mfg. Co.
National Safety Device & Mfg. Co.

Alloys, Steel & Iron.
Titanium Alloy Mfg. Co.

Alloys, and Bearing Metals. (See Bearings and Bearing Metals.)

Anchors, Guy.
Electric Service Supplies Co.
Holden & White.
Johns-Manville Co., H. W.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Automobiles and Busses.
Brill Co., The J. G.

Axle Straighteners.
Columbia M. W. & M. I. Co.

Axles.
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Cincinnati Car Co.
Hadfields, Ltd.
St. Louis Car Co.
Standard Steel Works Co.
Taylor Electric Truck Co.
U. S. Metal and Mfg. Co.
Westinghouse Elec. & M. Co.

Babbitting Devices.
Columbia M. W. & M. I. Co.

Badges and Buttons.
American Railway Supply Co.
Electric Service Supplies Co.
International Register Co.
Woodman Mfg. & Supply Co., R.

Bankers and Brokers.
Coal & Iron National Bank.
National City Co.

Batteries, Dry.
Johns-Manville Co., H. W.

Batteries, Storage.
Electric Storage Battery Co.

Bearings and Bearing Metals.
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
More-Jones Brass & M. Co.
St. Louis Car Co.
Taylor Elec. Truck Co.
Westinghouse Elec. & M. Co.

Bearings, Center.
Baldwin Locomotive Works.
Holden & White.

Bearings, Oil-less, Graphite Bronze and Wood.
Bound Brook Oil-less Bearing Co.

Bearings, Roller and Ball.
Gurney Ball Bearing Co.
Hess-Bright Mfg. Co.
Railway Roller Bearing Co

Bearings, Roller Side.
Holden & White.

Bells and Gongs.
Brill Co., The J. G.
Electric Service Supplies Co.
St. Louis Car Co.

Benders, Rail.
Niles-Bement-Pond Co.
Watson-Stillman Co.
Zelnicker Supply Co., W. A.

Blasting Powder & Equipment.
Du Pont de Nemours & Co., E. I.

Blow Torches for Soldering and Brazing. (See Cutting Apparatus, Oxy-Acetylene.)

Blowers.
General Electric Co.
Westinghouse Elec. & M. Co.

Boiler Cleaning Compounds.
Dearborn Chemical Co.
Johns-Manville Co., H. W.

Boiler Coverings.
Johns-Manville Co., H. W.

Boiler Graphite.
Dixon Crucible Co., Joseph.

Boilers.
Babcock & Wilcox Co.

Bond Clips.
Electric Railway Improve. Co.

Bond Testers.
American Steel & Wire Co.

Bonding Apparatus.
Electric Railway Improve. Co.
Ohio Brass Co.
Oxweld Acetylene Co.
Prest-O-Lite Co., Inc., The.

Bonding Tools.
American Steel & Wire Co.
Electric Railway Improve. Co.
Electric Service Supplies Co.
Ohio Brass Co.

Bonds, Rail.
American Steel & Wire Co.
Electric Railway Improve. Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Bonds, Welded.
Lincoln Bonding Co.

Book Publishers.
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel.
Niles-Bement-Pond Co.

Braces, Rail.
Kilby Frog & Switch Co.

Brackets and Cross Arms. (See also Poles, Ties, Posts, Piling and Lumber.)
Bates Expanded Steel Truss Co.
Creaghead Engrg. Co.
Electric Ry. Equipment Co.
Electric Service Supplies Co.
International Creo. & C. Co.
Lindsley Bros. Co.
Ohio Brass Co.

Brake Adjusters.
Holden & White.
Smith-Ward Brake Co.

Brake Shoes.
American Brake S. & Fdy. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Long Co., E. G.
St. Louis Car Co.
Taylor Elec. Truck Co.
Wheel Truing Brakeshoe Co.

Brakes, Brake Systems and Brake Parts.
Ackley & Co., G. S.
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Holden & White.
Long Co., E. G.
Lord Mfg. Co.
National Brake Co.
National Safety Device & Mfg. Co.
St. Louis Car Co.
Taylor Elec. Truck Co.
Westinghouse Trac. Brake Co.

Brazing. (See Welding.)

Brooms, Track, Steel or Rattan.
Zelnicker Supply Co., W. A.

Brushes, Carbon.
Dixon Crucible Co., Joseph.
General Electric Co.
Jeandron, W. J.
Morgan Crucible Co.
Westinghouse Elec. & M. Co.

Brush Holders.
Anderson Mfg. Co., A. & J. M.

Bumpers, Car Seat.
Electric Service Supplies Co.

Bunting.
Boyle & Co., Inc., John.

Bushings, Case Hardened Manganese.
Bemis Car Truck Co.

Bushings, Fibre.
Diamond State Fibre Co.

Bushings, Graphite & Wooden.
Bound Brook Oil-less Bearing Co.

Buttons. (See Badges and Buttons.)

Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.)

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc., see those Headings.)

Car Stop, Automatic.
Consolidated Car-Heating Co.

Car Trimmings. (For Curtains, Doors, Seats, etc., see those Headings.)

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cincinnati Car Co.
Jewett Car Co.
Kuhlman Car Co., G. C.
St. Louis Car Co.
Wason Mfg. Co.
Witt, Peter.

Cars, Second Hand.
Electric Equipment Co.

Cars, Self-Propelled.
Electric Storage Battery Co.
General Electric Co.

Castings, Brass.
Frankel Connector Co.
More-Jones Brass & M. Co.

Castings, Composition or Copper.
Anderson M. Co., A. & J. M.

Castings, Gray Iron and Steel.
American B. S. & Fdry. Co.
American Steel Foundries.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Hadfields, Ltd.
Long Co., E. G.
St. Louis Car Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.

Castings, Malleable and Brass.
American Brake S. & Fdry. Co.
Bemis Car Truck Co.
Hadfields, Ltd.
Long Co., E. G.
St. Louis Car Co.

Catchers and Retrievers, Trolley.
Electric Service Supplies Co.
Holden & White.
Long Co., E. G.
Lord Mfg. Co.
Ohio Brass Co.
Trolley Supply Co.
Wood Co., C. N.

Ceiling, Car.
Pantasote Co., The.

Chargers, Storage Battery.
General Electric Co.

Checks, Employees.
American Railway Supply Co.

Cheese Cloth.
Boyle & Co., Inc., John.

Chemists.
Little, Inc., Arthur D.

Circuit Breakers.
Cutter Electrical & Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Clamps and Connectors, for Wires and Cables.
Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co.
Frankel Connector Co.
General Electric Co.
Klein & Sons, M.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Cleaners and Scrapers, Track. (See also Snow-Plows, Sweepers and Brooms.)
Brill Co., The J. G.
Cincinnati Car Co.
Ohio Brass Co.
Root Spring Scraper Co.

Cleats, Car Wiring.
General Electric Co.

Clusters and Sockets.
General Electric Co.

Model 370—A. C. and D. C. Ammeter

One of the Portable Electrodynamometer Group, which also includes Model 310 Single Phase and D. C. Wattmeter, Model 329 Polyphase Wattmeter and Model 341 A. C. and D. C. Voltmeter.

The characteristics of the group are extreme accuracy (guaranteed within a fraction of 1% full scale value), adaptability for use on circuits of any commercial frequency and any wave form, great overload capacity, low moment of inertia, effective damping and shielding, and the legibility and remarkable uniformity of the hand calibrated scales.

THERE has been no other factor in creating the prestige which now surrounds the Weston name than the outstanding superiority of

Weston

Indicating Instruments

So high have Weston products established the name in the field of Electrical Measurement that it is in itself an endorsement of each Instrument that bears it.

It is our fixed purpose to maintain, and if possible to increase, the value of this endorsement.

Weston Indicating Instruments include a great variety of groups for portable or switchboard service on A. C. or D. C. Circuits, Instruments designed expressly for testing and laboratory use, for motor car and boat electrical systems, and many others for special purposes. Write for Bulletins or Catalogs describing those which interest you.

Weston Electrical Instrument Company
21 Weston Ave., Newark, N. J.

New York, Philadelphia, Pittsburgh, Cleveland, Cincinnati, Petrograd, Chicago, Boston, Buffalo, Richmond, San Francisco, Florence, Denver, Detroit, St. Louis, Toronto, Winnipeg, Johannesburg, S. Africa., Montreal, Vancouver, Berlin, London, Paris

U. S. Metal & Mfg. Co.
165 BROADWAY, NEW YORK CITY
Chicago Washington, D. C.

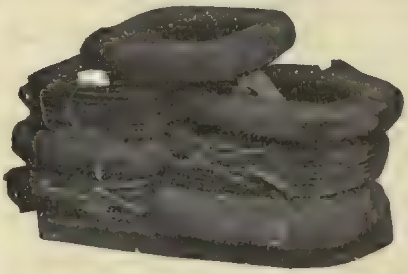
RAILWAY SUPPLIES

SELLING AGENTS FOR

Tool Steel Gears and Pinions
Johnson Fare Box
Perry Side Bearings
Hartman Centering Center Plates
Wasson Trolley Bases
Garland Ventilator
Electric Arc Welders
High Class Railway Varnishes and Enamels
Chillingworth Seamless Gear Cases

Special Agents for { Tool Steel Gear & Pinion Co.
Johnson Fare Box Co.
C. & C. Electric & Mfg. Co.
Holden & White

General Agents for Anglo-American Varnish Co.
Eastern Agents for Union Fibre Co.
Southern and New England Agents for Thayer & Co.



Every Penny Saved

from operating expenses, is just so much gained for the dividend account. Save money, and increase your dividends by using the

Independent Treatment Of Old Field Coils

You pay us the trifling cost of the insulation and we'll return to you for every old coil a coil equal to and in most cases better than a new coil. A coil that reflects skilled labor, up-to-date equipment and that degree of perfection that only comes through doing one thing for ever so long and doing it well.

And don't forget the insulation we use is Salamander Pure Asbestos—a guarantee of long life and dielectric strength.

Correspondence Solicited.

Independent Lamp & Wire Co., Inc.
Offices: 1737 Broadway, New York
FACTORIES: York, Pa., and Weehawken, N. J.

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Coal and Ash Handling. (See Conveying and Hoisting Machinery.)

Coil Banding and Winding Machines.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Coils, Armature and Field.
Cleveland Armature Works.
Coil Mfg. & Repair Co.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Independent Lamp & Wire Co.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coin-Counting Machines.
Electric Service Supplies Co.
International Register Co.
Johnson Fare Box Co.

Commutator Slotters.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Wood Co., C. N.

Commutator Truing Devices.
General Electric Co.

Commutators or Parts.
Cameron Elec'l Mfg. Co.
Cleveland Armature Works.
Coil Mfg. & Repair Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
Westinghouse Elec. & M. Co.

Compressors, Air.
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Trac. Brake Co.

Condensers.
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Conduit, Flexible.
Tubular Woven Fabric Co.

Conduits, Underground.
Johns-Manville Co., H. W.
Standard Underground Cable Co.

Connectors, Solderless.
Frankel Connector Co.

Controller Fingers.
Lord Mfg. Co.

Controller Handles.
Lord Mfg. Co.

Controller Regulators.
Electric Service Supplies Co.

Controllers or Parts.
Allis-Chalmers Mfg. Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Eureka Co.
General Electric Co.
Johns-Manville Co., H. W.
Westinghouse Elec. & M. Co.

Controlling Systems.
General Electric Co.
Westinghouse Elec. & M. Co.

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Barrett's
PAVING
PITCH

Makes your track paving frost-proof

LAST Spring the Electric Railway Journal collected photographs showing various brick and wood block pavements which had "heaved up" adjoining street car rails through the action of frost. Dampness and water had gotten through the pavement by reason of the inadequacy of the filler, had frozen and expanded underneath and caused upheaval along the rails which in many cases necessitated costly repairs.

Cement filler never stays tight adjoining street car rails. The vibration of the rails pulverizes it like a hammer. Asphalt filler usually cleaves from the blocks too easily to give satisfactory protection, while sand filler, of course, does not even attempt to close the joints against moisture.

Barrett's Paving Pitch, however, is so plastic and has such high natural adhesion to the brick, stone or wood block that it maintains a perfect seal through summer and winter. When the blocks contract in cold weather, the pitch simply sinks a little lower in the joints, but never lets go of the blocks.

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A pitch filled pavement is quieter and less reverberant under the passing cars. It permits the removal of the blocks at any time for track repairs without destruction of the pavement, for the same blocks can always be put back in place.

One of the engineers of the Special Service Department of The Barrett Company has made a special study of track paving problems. The results of this study and experience are at your service.

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American Steel & Wire Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Johns-Manville Co., H. W.
Klein & Sons, M.
Railway Track-work Co.

Torches, Acetylene. (See Cutting Apparatus, Oxy-Acetylene.)

Towers & Transmission Structures.
Archbold-Brady Co.
Bates Expanded Steel Truss Co.
Westinghouse Elec. & M. Co.

Tower Wagons & Automobiles.
McCardell & Co., J. R.

Track, Special Work.
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Barbour-Stockwell Co.
Cleveland Frog & Crossing Co.
Columbia M. W. & M. I. Co.
Indianapolis Switch & Frog Co.
Kilby Frog & Switch Co.
New York S. & Cross. Co.
Ramapo Iron Works.

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Transfer Issuing Machines.
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Transfer Tables.
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Packard Electric Co.
Westinghouse Elec. & M. Co.

Trap Doors.
Edwards Co., The O. M.

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American Mason Safety T. Co.

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Electric Service Supplies Co.
General Electric Co.
Holden & White.
Lord Mfg. Co.
More-Jones Brass & M. Co.
Nuttall Co., R. D.
Ohio Brass Co.
Trolley Supply Co.

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Holden & White.

Trolley Shoes
Holden & White.
Miller Trolley Shoe Co.

Trolleys and Trolley Systems.
Ford Chain Block & Mfg. Co.

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Baldwin Locomotive Works.
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Long Co., E. G.
St. Louis Car Co.
Taylor Elec. Truck Co.

Turbines, Steam.
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Westinghouse Elec. & M. Co.

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Ohio Brass Co.

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Drouve Co., The G.

Ventilators, Car.
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Cincinnati Car Co.
Holden & White.
Railway Utility Co.
St. Louis Car Co.

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Washers.
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Diamond State Fibre Co.

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Scaife & Sons Co., Wm. B.

Welders, Portable, Electric.
Indianapolis Switch & Frog Co.

Welding Processes and Apparatus.
Electric Railway Improve. Co.
General Electric Co.
Oxweld Acetylene Co.
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U. S. Metal & Mfg. Co.
Westinghouse Elec. & M. Co.

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Wheel Truing Brake Shoe Co.

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American Steel & Wire Co.
Association of Mfrs. of Chilled Car Wheels.
Bemis Car Truck Co.
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Wires and Cables.
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American Steel & Wire Co.
Bridgeport Brass Co.
D & W Fuse Co.
General Electric Co.
Kerite Insulated Wire & Cable Co.
Okonite Co.
Packard Electric Co.
Page Woven Wire & Fence Co.
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Standard Underground Cable Co.
Westinghouse Elec. & M. Co.

Wood Preservatives.
Barrett Co., The.
Internat'l Creo. & Con. Co.
Lindsley Bros. Co.
Reeves Co., The.
Sherwin-Williams Co.
Union Insulating Co.

Woodworking Machinery.
Allis-Chalmers Mfg. Co.

The On-Time Advertiser

who gets his copy and cuts to us well before the day his advertisement should go to press, gets better type composition, better location and a better opportunity to make necessary corrections on the proofs, which can then be submitted before publication.

The Last-Hour Advertiser

whose copy and cuts come in at the last minute or even later, gets the best attention we can possibly give him. We work overtime to do what we can for him. But the lack of sufficient time makes it physically impossible to do as well for him as for the advertiser whose instructions come in well before the last hour.

Get Your Copy and Cuts in Early

Do this, not on our account, but for the sake of your own advertising. We want to serve all advertisers equally well—but we can't put more hours into a day, and the advertiser who gives us the most time gets the best results.

Copy and cuts should be in our hands by Thursday of the week preceding the date of issue. This means that Thursday is the *last* day on which copy can be handled normally.

After that we cannot promise proofs, and we cannot insure classification.

For good advertising, get your cuts and copy in every week *before* Thursday.

Electric Railway Journal
239 West 39th Street, New York

Safari

The nightie has no place with the burden bearers of an African hunting trip. All day under the blistering sun your Safari man will wear all he possesses even to an overcoat that some traveller has discarded; but, when the chill of evening descends then he strips to bronze and savage nakedness.

"But why do they have that foolish custom?" you say.

Not so hasty, please, in stamping other people's customs foolish! We know men who regularly pay for truing up commutators that are grooved by bad brushes

—that's just as foolish!

We know men who buy large quantities of lubricant to help out cheap semi-lubricating brushes

—that's just as foolish!

Both cases can be prevented by a prescribed Morganite brush and a big brush saving thereby effected.

That's the naked truth.

Be sensible!

The
Morgan Crucible
Company Limited
120 Liberty St, New York City

Factory, Brooklyn, N. Y.

AGENTS:

Lewis & Roth Co., 1012 Liberty Bldg., Philadelphia

Electrical Engineering & Mfg. Co.
First National Bank Bldg., Pittsburgh

W. L. Rose Equipment Company, La Salle Bldg.
St. Louis, Mo.

Herzog Electric & Eng'g Co., 150 Steuart St.
San Francisco, Cal.

ALPHABETICAL INDEX TO ADVERTISEMENTS

NOTICE TO ADVERTISERS:

Printing begins on Tuesday of each week.

Changes of copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for OK before publication.

New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.

If proofs before printing are required, change of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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TITANIUM TREATED RAILS

Carry the Busy Los Angeles Traffic

Broadway, Looking North from Sixth Street
—The Heavy Traffic Street of Los Angeles

On Broadway—only one of several Titanium-railed Los Angeles streets—the traffic totals 2352 cars, averaging 38,000 lb. empty, between 6 A. M. and midnight.

And on this street of busy traffic 1096 tons of Titanium-Treated Rails have been giving perfect service since 1911. The rail is T-section, 87-lb., 7¼-in., laid on 6-in. x 7-in. x 6-ft. concrete ties.

Consider what the use of anything other than the best rail can do to your schedules and to your profits—

And remember that Titanium-Treated Rail is more than the rail of today—it is the rail which guarantees you a future of dependable service.

TITANIUM ALLOY MANUFACTURING COMPANY

Operating Under Rossi Patents

Processes and Products Patented

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Niagara Falls, N. Y.

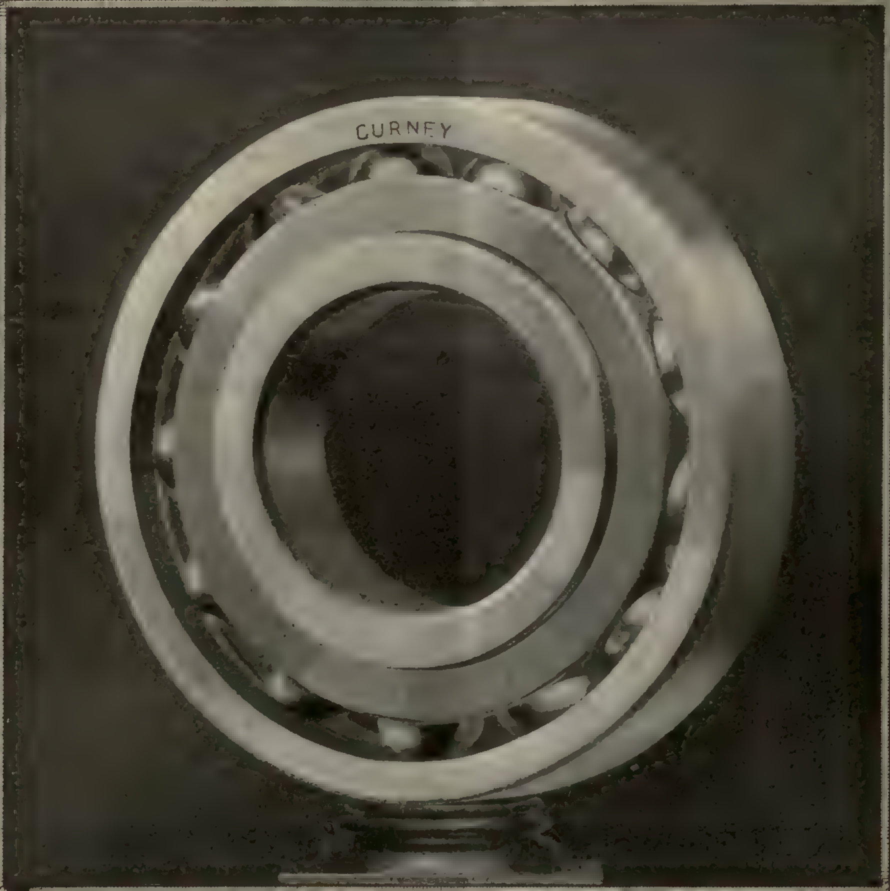
TPC
Reg. U. S. Pat. Off.
TRADE MARK.

Pittsburgh Office: Oliver Building
Chicago Office: Peoples Gas Building

New York Office: 15 Wall Street

AGENTS

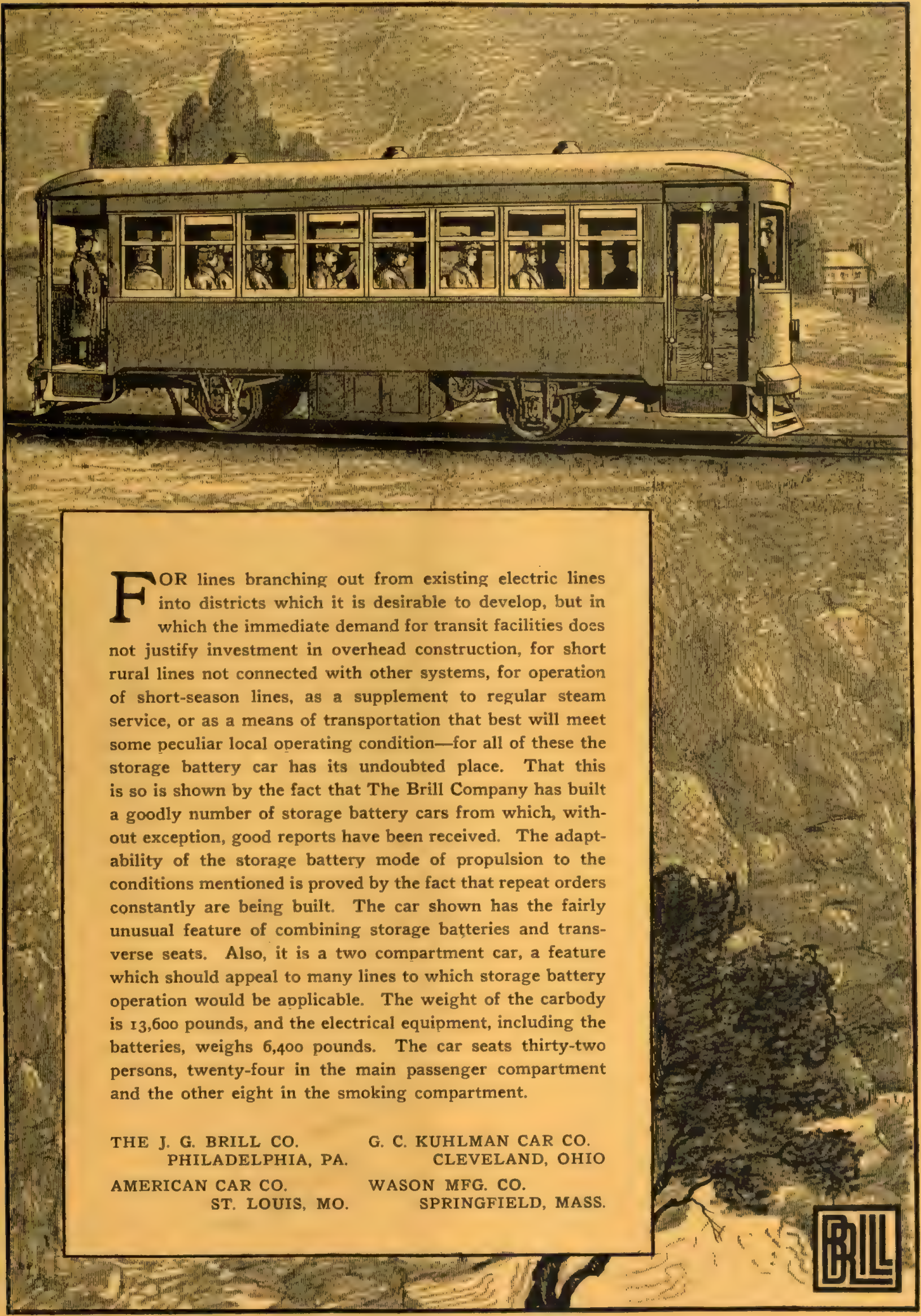
Pacific Coast: ECCLES & SMITH CO., Los Angeles, San Francisco, Portland
Great Britain and Europe: T. ROWLANDS & CO., Sheffield, England



CAPACITY
GURNEY
ENDURANCE

GURNEYIZING THE ROLLING STOCK PUTS OFF THE DAY WHEN REBUILDING AND EXTENSIONS OF THE POWER PLANT AND SUB-STATIONS BECOME NECESSARY.

GURNEY BALL BEARING CO.
CONRAD PATENT LICENSEE
JAMESTOWN NEW YORK
CHICAGO ILL. NEW YORK CITY



FOR lines branching out from existing electric lines into districts which it is desirable to develop, but in which the immediate demand for transit facilities does not justify investment in overhead construction, for short rural lines not connected with other systems, for operation of short-season lines, as a supplement to regular steam service, or as a means of transportation that best will meet some peculiar local operating condition—for all of these the storage battery car has its undoubted place. That this is so is shown by the fact that The Brill Company has built a goodly number of storage battery cars from which, without exception, good reports have been received. The adaptability of the storage battery mode of propulsion to the conditions mentioned is proved by the fact that repeat orders constantly are being built. The car shown has the fairly unusual feature of combining storage batteries and transverse seats. Also, it is a two compartment car, a feature which should appeal to many lines to which storage battery operation would be applicable. The weight of the carbody is 13,600 pounds, and the electrical equipment, including the batteries, weighs 6,400 pounds. The car seats thirty-two persons, twenty-four in the main passenger compartment and the other eight in the smoking compartment.

THE J. G. BRILL CO.
PHILADELPHIA, PA.

G. C. KUHLMAN CAR CO.
CLEVELAND, OHIO

AMERICAN CAR CO.
ST. LOUIS, MO.

WASON MFG. CO.
SPRINGFIELD, MASS.

Moving Mountains

"Electrification has been such a tremendous success on the Milwaukee road that it is difficult to state the results without seeming exaggeration, but I think it quite within the fact to say that the Milwaukee road has forgotten that the Continental Divide exists."

C. A. GOODNOW
Assistant to the President,
C. M. & St. P. Ry.

General Electric Company

General Offices:
Schenectady, N.Y.

Sales Offices
in all large cities

Reconstruction of Power Station at Holyoke

ELECTRIC RAILWAY JOURNAL

New York, December 9, 1916 McGraw Publishing Co. Inc. Vol. 48, No. 24 10c a copy

Collier Service

THE Master Mind which has made advertising space in your cars valuable to you. This earning asset, operated through Collier Service, is removed from the field of uncertainty and speculation to that of soundness and stability.

Barron G. Collier
INCORPORATED

"JOE, while I think of it," said the General Manager to the Superintendent, "make a memorandum to stop over at East Pittsburgh on your way East next week, and make a more thorough investigation than we had time for at the convention, of that Westinghouse HLD Control for low-floor cars there is so much talk about, and also their No. 514 motor. They tell me it's the lightest weight 40 horsepower motor ever built and the best all round motor for city and light suburban service, as it can be used with any sized wheel from 24 inches to 33 inches."

"I'll make the memo all right, Boss," answered Joe, "but I don't need to, as I intended stopping over at East Pittsburgh anyway, for that very purpose. You know, Boss, those low-floor, center entrance cars are what we'll need, when we replace some of our old timers, and this Westinghouse HLD Control and No. 514 motor equipment seem to fill the bill."

"Westinghouse equipment has never failed us yet, Joe," said the General Manager, "and it's a safe bet that it never will."

Westinghouse Electric & Manufacturing Co.

Sales Offices in all
Large American Cities

East Pittsburgh
Pennsylvania

ELECTRIC RAILWAY JOURNAL

VOLUME XLVIII, No. 24 NEW YORK, DECEMBER 9, 1916 PAGES 1187 TO 1230

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JAMES H. MCGRAW, President. A. E. CLIFFORD, Secretary. J. T. DE MOTT, Treasurer. H. W. BLAKE, Editor.
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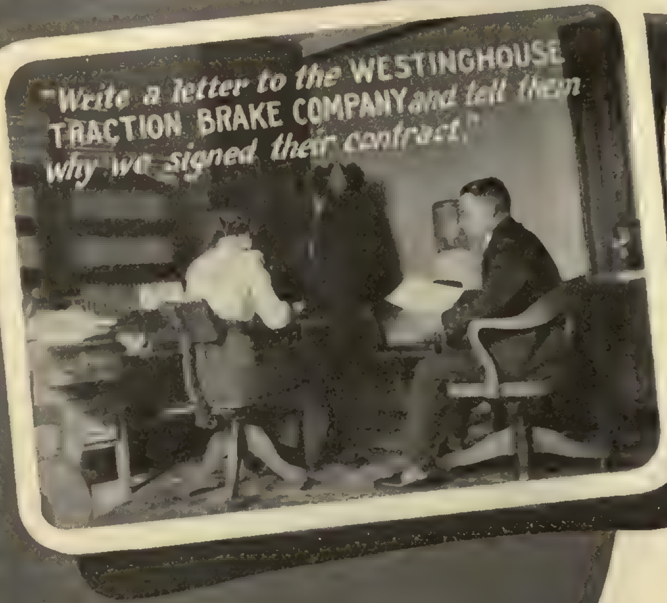
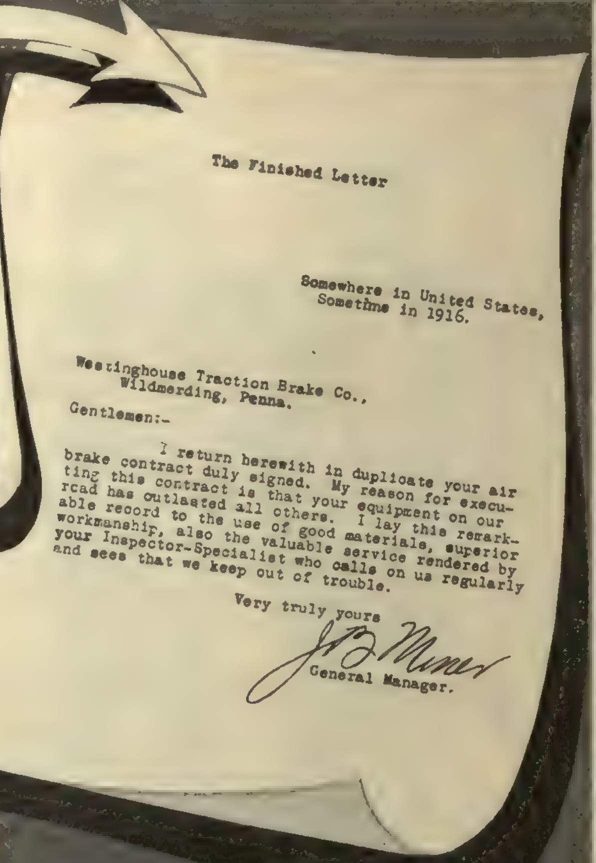

"Write a letter to the WESTINGHOUSE TRACTION BRAKE COMPANY and tell them why we signed their contract."



The Finished Letter

Somewhere in United States,
Sometime in 1916.

Westinghouse Traction Brake Co.,
Wildmerding, Penna.

Gentlemen:-

I return herewith in duplicate your air brake contract duly signed. My reason for executing this contract is that your equipment on our road has outlasted all others. I lay this remarkable record to the use of good materials, superior workmanship, also the valuable service rendered by your Inspector-Specialist who calls on us regularly and sees that we keep out of trouble.

Very truly yours
J B Miner
General Manager.

This is one of a number of Westinghouse Air Compressors installed in June 1907, having made approximately 980000 miles, costing little for repairs, and is still running strong and efficiently. Best materials, superior workmanship and Inspector-Specialist Service did it.

Westinghouse Traction Brake Company

General Offices: Wilmerding, Pa.

PITTSBURGH:
Westinghouse Building
CHICAGO:
Railway Exchange Building

TRADE MARK

NEW YORK:
City Investing Building
ST. LOUIS:
Boatmen's Bank Building

Westinghouse

Pin-Type Porcelain Insulators

For All Classes Of Service

Consider these 9 points before placing your next order:

1. Correctly Designed
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3. Thoroughly Tested
4. Rigidly Inspected
5. Conservatively Rated
6. Uniformly Glazed
7. Lasting Quality
8. Carefully Packed
9. Promptly Shipped

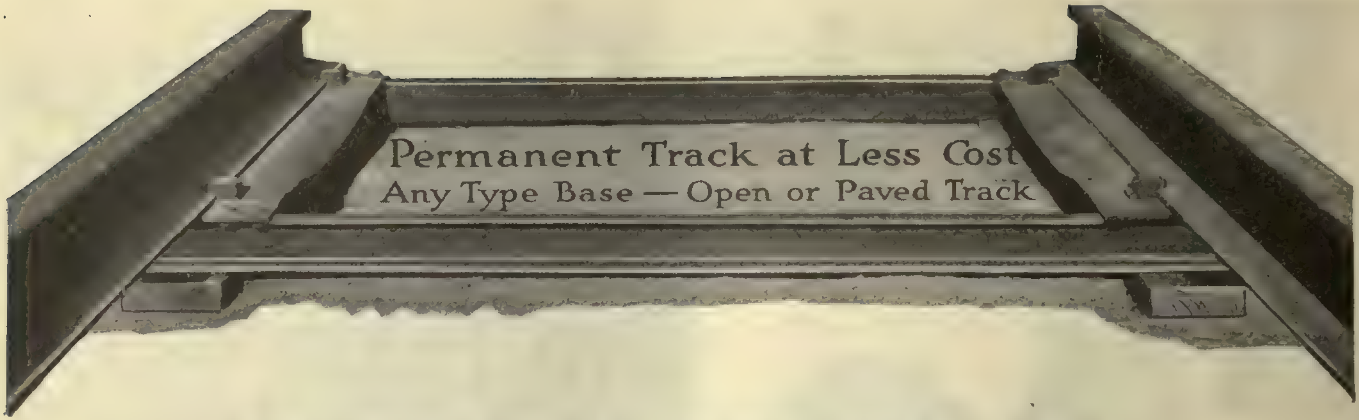
Sample of Insulator designed for your needs, upon request

Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.
Sales Offices in All Large American Cities

458

WESTINGHOUSE ELECTRIC

Sole Agent In The United States for the Pittsburgh High-Voltage Insulator Company


Permanent Track at Less Cost
Any Type Base — Open or Paved Track

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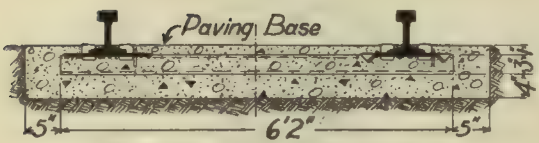
STEEL TWIN TIES

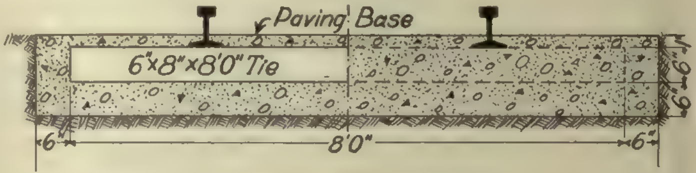
33% to 45% Saved in Construction Materials

First in blocking to grade and line. Three wood ties require six blocks. An International Steel Twin Tie requires only four blocks—a saving of 33 1/3% in blocking!

Look at the concrete required for the two track sections below—



International Steel Tie Construction



Standard Wood Tie Construction

The wood tie construction requires 1495 cubic yards of concrete per mile of track. International Tie construction, because of the shallow foundation, requires only 790 cubic yards of concrete per mile of track. There's a 48% saving in concrete for foundation or ballast, with 7 inches instead of only 6 inches of effective bearing material beneath the tie.

Another saving—2 feet less paving has to be put back because International Ties require an excavation of only 7 feet wide as against 9 feet for wood tie construction. There's at least 20% saving in repaving.

And bear in mind you are getting about 50% more speed all the time—delays are eliminated—everything goes forward on schedule.

If you don't believe it ask the man who has used International Steel Twin Ties.

Let us submit comparative estimates for your job.

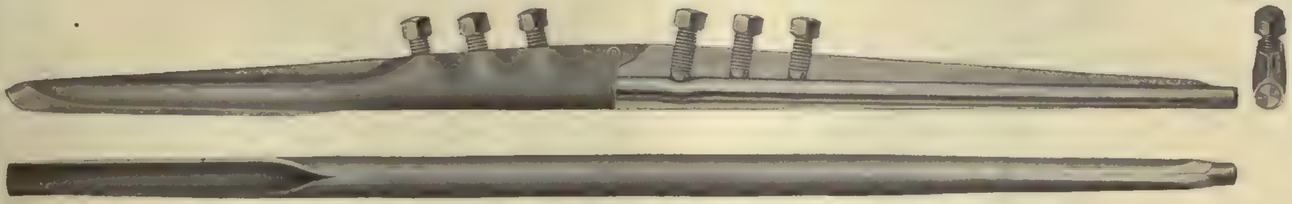
The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations

General Sales Office and Works: Cleveland, Ohio

REPRESENTATIVES:

Western Eng'g Sales Co., San Francisco, Cal. Los Angeles, Cal. Seattle, Wash.
R. J. Cooper Co., Salt Lake City, Utah.
J. E. Lewis & Co., Dallas, Texas.
Maurice Joy, Philadelphia.
William H. Ziegler, Minneapolis, Minn.



Type C Splicer Sectioned to show how wire enters in a straight line

Here's a Chance for Real Economy

Present conditions have led Electric Railways to devise means to extend the life of new trolley wire and to get more service out of worn wire which formerly would have been dumped on the scrap-heap.

And they are finding that the O-B Type C Splicer is a big help. It works as well on old wire as on new.

The wire goes in with practically no bending. Hence there is little chance for badly worn wire to be broken or for new wire to be weakened during installation.

Lips fold around the wire to form a gradual approach. Trolley wheel glides smoothly from wire to Splicer and off again. Arcing is reduced and that much more is added to the life of the wire.

Wire is held by steel set screws. There is a depression under each inner screw which greatly increases holding power. Wire will break before it slips.

Splicer is narrow with plenty of wheel clearance.

Its low center of gravity keeps it from turning over.

It may be furnished with or without a boss.

Sample sent on request

The Ohio Brass Company
Mansfield, Ohio

Phono-Electric

Trolley Wire needed a short circuit to make it fall!

On the famous Brooklyn Bridge, trolley wire wear is extremely rapid both because of the service and the heavy grades. Ordinary trolley wire is simply out of the question.

The value of Phono-Electric under such conditions can be illustrated by the following instance:

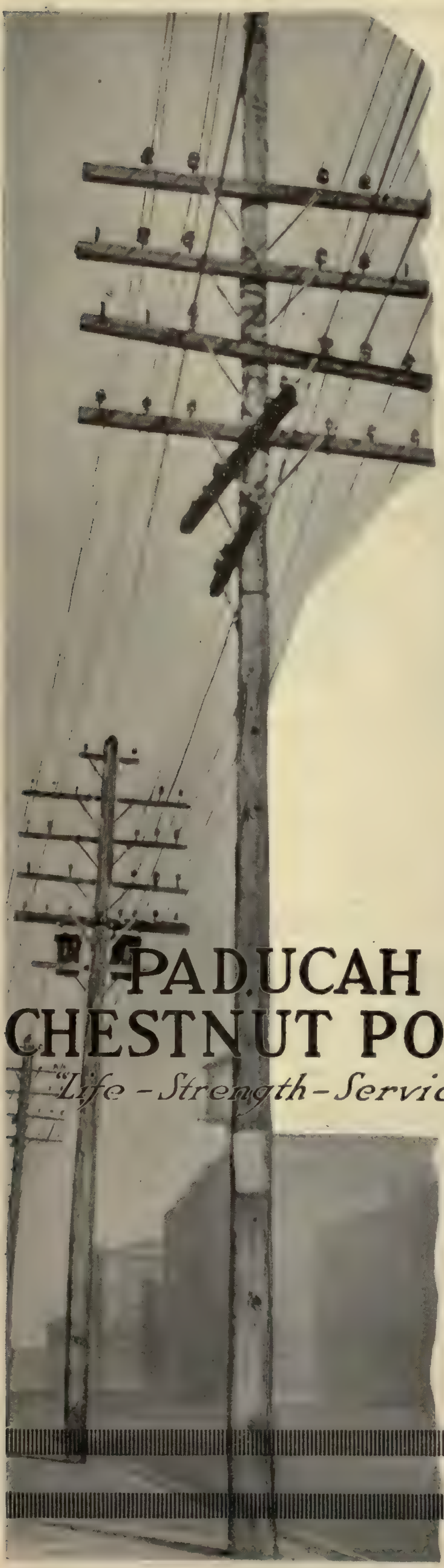
One part of the Phono-Electric Trolley Wire on this bridge comprised a section 456 feet long, of No. 000.

In spite of the excessive wear to which it was subjected, it stayed up for ten months without a single break—a most remarkable life for trolley wire on the Brooklyn Bridge.

And Phono-Electric came down only when it was burnt in two by the grounding of a trolley pole on a mast arm.

Here, the experience of the company shows that Phono-Electric has given two to three times the life of ordinary copper wire.

Bridgeport Brass Company, Bridgeport, Conn.



How Do You Buy Poles?

When you build a line, don't you figure on the qualities of wire? Don't you find out about qualities of insulators?

Don't you consider what that line has got to go through under the adverse conditions of heat and cold and wet and sleet and wind and storm?

Why don't you make some investigations and do some thinking about qualities of poles, the strength of poles, etc.?

Are not the poles the foundation and basis of the whole line? If the poles go down, you haven't much of a line left, have you?

The more you learn about poles the more certain you are going to specify and use Paducah Chestnut Poles.

Proof? All you want. Just ask for it.

Paducah Pole & Timber Co.

John L. Fay, Sales Mgr.

408 City Nat'l Bank Bldg., Paducah, Ky.

Producers of Chestnut Poles, Cypress and Long-leaf Yellow Pine Cross Arms, Piling, Bridge Timbers, Red Cedar Posts and Lumber

Yards: Paducah, Ky. Metropolis, Ill. Dividing Ridge, Ky. Bonnieville, Ky. Munfordville, Ky. Mansfield, Tenn.

407

1917

What Are Your Sales Plans for the New Year?

Electric railway earnings for 1916 are proving a lot better than for 1915.

For instance, the operating revenue of companies operating a total of 7,444 miles of line, for January 1 to June 30, 1916, were $100,582,214—

—or 8.08 per cent more than for the same period of 1915.

Electric railways will buy more in 1917:

Because of constantly rising earnings due to the general good times—

Because money available for improvements and extensions is so abundant—

Because betterments in equipment and in operating practice promise a bright future for electric railway properties.

You Can Get Your Full Share of Business

only by backing up your products, your facilities and your salesmen by a carefully planned advertising campaign in the one medium which reaches 99 per cent of your customers—

Electric Railway Journal

Whatever plans you may have for the year as a whole, you must not fail to appear in the first issue of the year, with its exclusive data on the business of the year, the

Annual Statistical Number

January 6, 1917

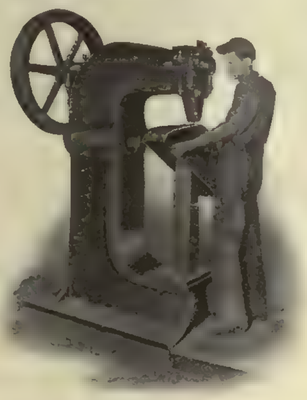
Member Audit Bureau of Circulations

The Facts Behind the Keystone Case

They are constructed of the best open-hearth deep drawing steel—the best that can be bought. It is tough and durable.

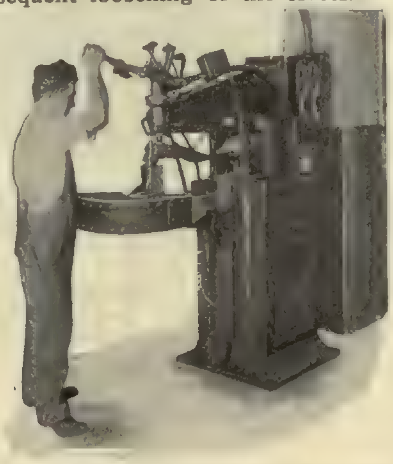
"A Sheet of Steel"

The periphery strips and sides are formed and riveted. But in Keystone Cases we do not depend on rivets alone.



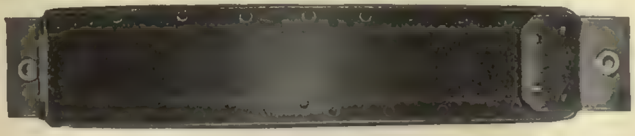
Riveting a Keystone Steel Gear Case

So Keystone Cases are electrically welded between the rivets to prevent slippage between sheets and the subsequent loosening of the rivets.



Spot Welding a Keystone Steel Gear Case

The result is a tight, rigid gear case which will withstand vibration and hard knocks. The nose brackets are so riveted to the case that the rivets pass through five thicknesses of metal. And throughout the entire construction of the Keystone Case great care is taken to prevent any injury to the steel.



Bottom of Lower Half of Keystone Steel Gear Case, Showing Riveting and Electrical Spot Welding along Periphery

Interior View of Upper Half of Keystone Steel Gear Case, Showing Internal Construction

And here is the light weight Keystone Steel Gear Case complete and ready to give you unequaled service.

A Light Weight Case

These facts do not cover a thousand refinements which have been made in the Keystone Steel Gear Case. They only give you the general principles that must enter into the construction of a gear case if it is to give the best service.

ELECTRIC SERVICE SUPPLIES CO.

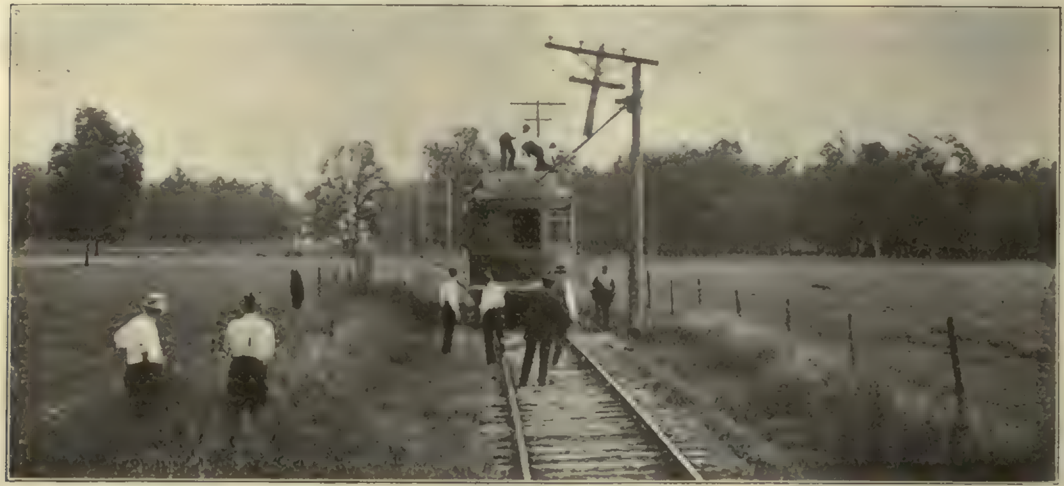
Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Sts.

NEW YORK
50 Church St.

CHICAGO
Monadnock Bldg.

One Wild Trolley Pole Did This



A Wasson Retrieving Base Would Have Prevented It

A broken wooden pole, a doubled-up trolley pole, a bent span pole, a delayed car, disgruntled passengers and expense of the line crew resulted from this single dewirement.

Material and labor for reconstruction, aside from the effect on reputation for uninterrupted passenger service, cost more than a Wasson air-retrieving trolley base.

If this car had been equipped with a Wasson base this could not have happened. The trolley pole which did this damage would have been retrieved within a second after it left the wire, forced to the roof and locked there. It could not have broken the wooden pole at the side.

The ordinary back platform retriever or catcher did not prevent this accident **because the trolley rope broke.** A Wasson base retrieves the pole even without a rope.

The Wasson air-retrieving base actually prevents damage overhead, with accompanying cost and delays in schedule. The base itself is so superior in wiring qualities that dewirements are less frequent than with an ordinary base, but when dewirements do occur no damage results.

Folders describing the Wasson retrieving and non-retrieving city type bases will be sent on request.

Holden & White

Sales Agents in the United States for The Wasson Engineering & Supply Company

1508 Fisher Building, Chicago

U. S. Metal & Mfg. Co., New York and Washington; C. F. Saenger & Co., Cleveland; Brown & Hall Supply Co., St. Louis; C. E. A. Carr Co., Toronto; W. M. McClintock, St. Paul; Alfred Connor, Denver; O. H. Davidson Equipment Co., Salt Lake City; F. F. Bodler, San Francisco; S. I. Wailes, Los Angeles; W. F. McKenney, Portland, Ore.

AMERICAN ARMCO INGOT IRON

"Armco" Iron Corrugated Siphons

solve many a problem for the railroad, highway or irrigation engineer. Wherever it is desirable to carry a stream under a roadway, railroad or another watercourse, this construction has many advantages.

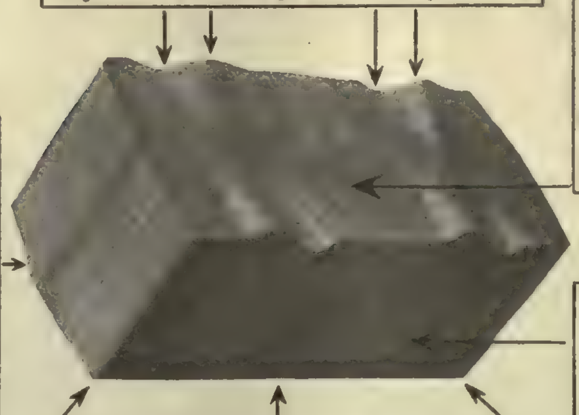
It is easily transported and installed; if necessary, it can be made perfectly water-tight; and once in place it is good for a long lifetime of service.

ARMCO IRON
Resists Rust

because of its unequaled purity and the scientific care which controls every phase of its production.

Write the nearest manufacturer for full information as to "Armco" Iron Culverts, Siphons, Flumes, Sheets, Roofing and Formed Products

Arkansas, Little Rock
Dixie Culvert & Metal Co.
California, Los Angeles
California Cor. Culvert Co.
California, West Berkeley
California Cor. Culvert Co.
Colorado, Denver
R. Hardesty Mfg. Co.
Delaware, Clayton
Delaware Metal Culvert Co.
Florida, Jacksonville
Dixie Culvert & Metal Co.
Georgia, Atlanta
Dixie Culvert & Metal Co.
Illinois, Springfield
Illinois Corrugated Metal Co.
Indiana, Crawfordsville
W. Q. O'Neall Co.
Iowa, Des Moines
Iowa Pure Iron Culvert Co.
Iowa, Independence
Independence Culvert Co.
Kansas, Topeka
The Road Supply & Metal Co.
Kentucky, Louisville
The Kentucky Culv. Mfg. Co.
Louisiana, New Orleans
Dixie Culvert & Metal Co.
Maryland, Baltimore
Wm. M. Baker, Munsey Bldg.
Massachusetts, Palmer
New England Metal Cul. Co.
Michigan, Bark River
Bark River Bridge & Cul. Co.
Michigan, Lansing
Michigan Bridge & Pipe Co.
Minnesota, Minneapolis
Lyle Corrugated Culvert Co.
Minnesota, Lyle
Lyle Corrugated Culvert Co.
Missouri, Moberly
Corrugated Culvert Co.
Montana, Missoula
Montana Culvert & Flume Co.
Nebraska, Lincoln
Lee-Arnett Co.
Nebraska, Wahoo
Nebraska Culvert & Mfg. Co.
Nevada, Reno
Nevada Metal Mfg. Co.
New Hampshire, Nashua
North East Metal Culvert Co.
New Jersey, Flemington
Pennsylvania Metal Cul. Co.
New York, Auburn
Pennsylvania Metal Cul. Co.
North Dakota, Wahpeton
No'western Sheet & Iron Wks.
Ohio, Middletown
American Rolling Mill Co.
The Ohio Corrugated Culvert Co.
Oklahoma, Shawnee
Dixie Culvert & Metal Co.
Oregon, Portland
Coast Culvert & Flume Co.
Pennsylvania, Warren
Pennsylvania Metal Cul. Co.
South Dakota, Sioux Falls
Sioux Falls Metal Culvert Co.
Tennessee, Nashville
Tennessee Metal Culvert Co.
Texas, Dallas
Wyatt Mfg. Co.
Texas, El Paso
Western Metal Mfg. Co.
Texas, Houston
Lone Star Culvert Co.
Utah, Woods Cross
Utah Corrugated Culvert & Flume Co.
Virginia, Roanoke
Virginia Metal Culvert Co.
Washington, Spokane
Spokane Cor. Cul. & Tank Co.
Wisconsin, Eau Claire
Bark River Bridge & Cul. Co.



1 Lugs and grooves formed in wire-cutting. Insure even spacing and leave ample space for distribution of the grout filler Lugs on this face only, correct laying made easy

2 The double-beveled ends insure good bonding.

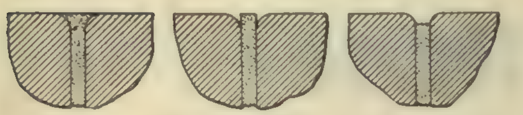
3 Sharp square edges allowing filler to be poured flush with the top of the pavement. It will not break away at the surface as it will with round edge "repressed brick"

4 Smooth uniform surface for exposed top of Brick.

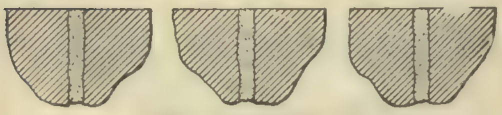
5 This face and the opposite one are rough to make the filler adhere.

Here Are Five Good Reasons Why You Should Select Wire-Cut Lug Brick

for all your paving between tracks. The special features of Wire-Cut Lug Brick and the latest methods of construction assure a smooth, solid, durable monolithic pavement that will withstand the vibration of your heaviest traffic and exclude water from your track substructure.



Repressed Brick



Wire-Cut Lug Brick

How Filler acts under Traffic with Repressed and Wire-Cut Lug Brick

The wire-cutting keeps the clay homogeneous, producing a texture which when vitrified becomes a tough, flinty block that resists both abrasion and breakage. The rough edges and uniform lugs give a positive bond to the cement grout, assuring a true monolithic structure when the brick are laid in a green concrete base or a cement sand bed; the square edges and flush joints assure a smooth surface that will *stay* smooth.

Write today for our engineering data, and remember that we want to help you solve your paving problems.

Manufacturers Licensed by

Dunn Wire-Cut Lug Brick Co., Conneaut, Ohio

LICENSEES:

Corry Brick & Tile Company, Corry, Pa.
United Brick Company, Greensburg, Pa.
  One plant at Conneaut, Ohio.
Sterling Brick Company, Olean, N. Y.
Reynoldsville Brick & Tile Co., Reynoldsville, Pa.
Danville Brick Company, Danville, Ill.
Clinton Paving Brick Company, Clinton, Ind.
Alton Brick Company, Alton, Ill.
Medal Paving Brick Co., Cleveland, Ohio.
  One plant at Cleveland, Ohio.
  One plant at Carrollton, Ohio.
  One plant at Malvern, Ohio.
  One plant at Wooster, Ohio.
Metropolitan Paving Brick Co., Canton, Ohio.
  Four plants at Canton, Ohio.
  One plant at Willow, Ohio.
Bessemer Limestone Co., Youngstown, Ohio.
  Three plants at Bessemer, Pa.
Peebles Paving Brick Co., Portsmouth, Ohio.
  Two plants at Portsmouth, Ohio.
  One plant at Firebrick, Ky.
Murphysboro Paving Brick Co., Murphysboro, Ill.
Southern Clay Mfg. Co., Chattanooga, Tenn.
  One plant at Robbins, Tenn.
  One plant at Coaldale, Ala.
  One plant at Birmingham, Ala.
McAvoy Vitrified Brick Co., Philadelphia, Pa.
  One plant at Perkiomen Junction, Pa.
Windsor Brick Company, Akron, Ohio.
Hocking Valley Brick Co., Columbus, Ohio.
  One plant at Logan, Ohio.
Veedersburg Paver Co., Veedersburg, Ind.
Springfield Paving Brick Co., Springfield, Ill.
Terre Haute Vitrified Brick Co., Terre Haute, Ind.
Albion Vitrified Brick Co., Albion, Ill.
Alliance Clay Products Co., Alliance, Ohio.
Westport Paving Brick Co., Baltimore, Md.
  One plant at Westport, Md.
The Mack Mfg. Co., New Cumberland, W. Va.
  Four plants at New Cumberland, W. Va.
The Hydraulic-Press Brick Co., St. Louis, Mo.
The Barr Clay Co., Streator, Ill.
Burton-Townsend Co., Zanesville, O. Two plants.
The Trimble Paving Brick Co., Dayton, Ohio.
  One plant at Trimble, Ohio.
  One plant at Glouster, Ohio.
The Thornton Fire Brick Co., Clarksburg, W. Va.
  One plant at Thornton, W. Va.
Indiana Paving Brick & Block Co., Brazil, Ind.
Standard Brick Co., Crawfordsville, Ind.
Shawmut Paving Brick Works, Shawmut, Pa.
The Pennsylvania Clay Co., Pittsburgh, Pa.
  One plant at Conway, Pa.
  One plant at Crows Run, Pa.
  One plant at Bradys Run, Pa.
Clydesdale Brick & Stone Co., Pittsburgh, Pa.
  Plant at Elwood City, Pa.
John Kline Brick Co., Wickliffe, Ohio.
Streator Clay Mfg. Co., Streator, Ill.
Martinsville Brick Co., Martinsville, Ind.
Cleveland Brick & Clay Co., Cleveland, Ohio.
Jamestown Shale Paving Brick Co.,
  Jamestown, N. Y.
Purington Paving Brick Co., Galesburg, Ill.

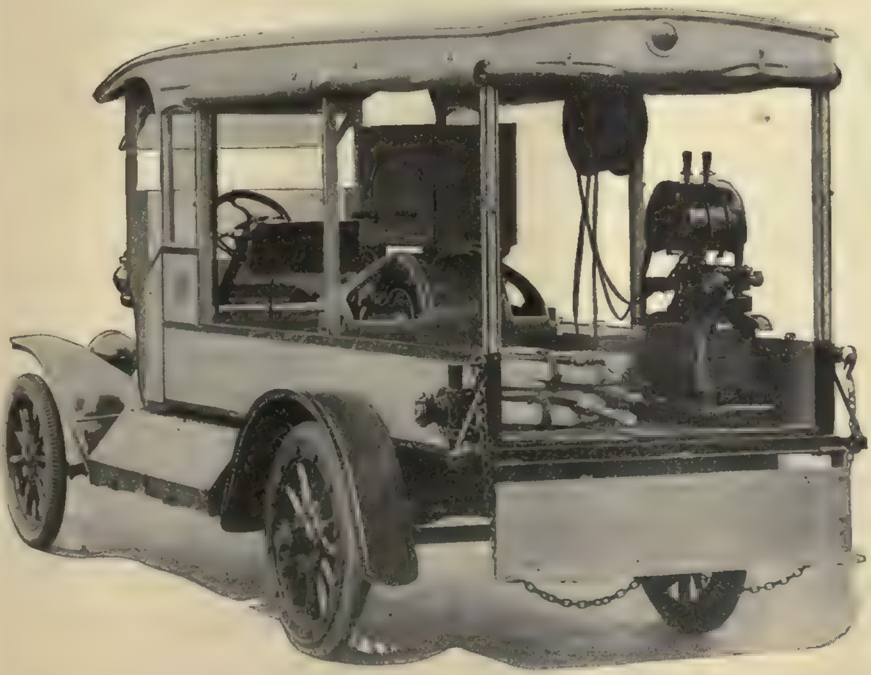
What is this Man Waiting for?

He is waiting for a car. He has a scant 8 minutes to catch a train—and the car is 5 minutes overdue. We cannot print what the man is thinking about the electric railway company.

Moral:

Use Champion Rail Bonds and keep up your schedules by keeping up your voltage.

Use a Champion Bonding Outfit that will install the bonds without holding up the cars.



**The
Electric Railway
Improvement Co.**

Cleveland, Ohio

Getting More Than Seven Hours Grinding Done in a Ten-Hour Day While Moving 250 Cars over Same Track

We told you last week how they were grinding joints at Dallas, Texas, at a cost of 15 cents per joint with the

Reciprocating Track Grinder

We also told how fast they were removing corrugations—500 feet of single rail per 10-hour day.

Did you fully realize the practical efficiency of the Reciprocating Grinder as shown by these figures?

Here is a line carrying cars at an average headway of a little less than 2½ minutes. In the face of this steady traffic the Reciprocating Grinder does a total of over seven hours' grinding in the ten-hour day—without causing any appreciable delay in the movement of the cars.

Getting a Reciprocating Grinder off and on the tracks requires only 40 seconds from the instant grinding stops until it begins again. A good, live crew frequently averages less than that time.

This is just one of the points of *practical* efficiency that have made Reciprocating Track Grinders standard on nearly 100 roads throughout the world.

You can put a Reciprocating Grinder on your tracks and determine its value for your work without having it cost you a cent—unless you want to keep it. That's the basis on which Reciprocating Grinders are sold. It's a basis that enables you to be absolutely sure of results in every way before you spend a cent.

Railway Track-work Co.

30th and Walnut Sts., Philadelphia

The Bay State Street Railway Adopted National Pneumatic Door and Step Control for 200 Remodeled Cars

To Help Its Men and To Get the Fares

Before the Bay State Street Railway ordered National Pneumatic door and step control for the remodeling of 200 cars, following its order for the equipment of 200 new cars—

It made a survey of door operating conditions which showed that a schedule speed of 8 miles per hour and six stops per mile demanded

864 Door Operations by the Conductor

during his normal working day of 9 hours. It was rightly considered that so many opening and closing operations tired the conductor and made it very difficult for him to

Get All the Fares

NATIONAL PNEUMATIC COMPANY

NPC

50 Church St. New York

515 Laflin St. Chicago

Richey's

Electric Railway Handbook

and the

Christmas Offer

IN accordance with our holiday custom of several years, we are offering *free* stamping of your name, or the name of the recipient, in gold, on any McGraw-Hill book ordered of us prior to January 1, 1917.

McGraw-Hill books make attractive and useful holiday gifts. The name of the recipient gives the gift a personal touch.

These are the conditions:

A—Stamped books are not returnable.
B—Orders for books to be stamped free must be sent direct to us—not through agents or booksellers—and the books must have a list price of not less than $1.00

Cash should accompany all orders for stamped books unless you have an account with us.

Electric Railway Handbook

By Albert S. Richey, E.E., Consulting Engineer, Professor of Electric Railway Engineering, Worcester Polytechnic Institute. 832 pages, flexible leather, pocket size, over 600 illustrations, $4.00 (English price, 17s.) net, postpaid.

The standard work to-day for electric railway men. It contains a collection of practical data, formulas and tables, classified and indexed for quick reference.

It covers Roadbed and Track, Buildings, Train Movement, Railway Motors, Controlling Apparatus, Current Collecting Devices, Trucks, Braking, Rolling Stock, Transmission and Distribution Signals and Communication.

Christmas Offer

McGraw-Hill Book Company, Inc.,
239 W. 39th Street, New York City.

Send me the following books; on proposition A or B: Strike out one.

A. Special Christmas Offer with the name stamped as printed below. Cash enclosed, $——.

B. On approval for 10 days. I agree to return the books or pay for them within 10 days of receipt.

Richey—Electric Railway Handbook, $4.00 net.

....

Signed ....

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...Subscriber E. R. J.? Member A. E. R. A. or A. I. E. E.?

If the books are to be stamped print the name to be stamped clearly on this line.

....E. 12-9

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Publishers of Books for Electric Railway Journal

Rico Coasting Recorders

are in use on more than

Ten Thousand Cars

saving several hundred thousand dollars per annum to electric railways in the United States, Canada, England and Australia.

DO YOU KNOW

that the Rico Coasting Recorder has made good on **every** type of electric railway operation in existence from light city to heavy electrification?

That the electric railways which have adopted Rico Coasting Recorders are among the most important in the world, with the best technical and operating staffs available?

And that every one of these railways, to be named in succeeding advertisements, is convinced that the Rico Coasting Recorder embodies

The True Principle for Measuring Operating Efficiency

Time is the Essence of Railroading

RAILWAY IMPROVEMENT COMPANY, 61 BROADWAY, NEW YORK

OILLESS TROLLEY WHEEL AND NON-ARCING HARP

THE V-K OILLESS TROLLEY WHEEL is the only trolley wheel capable of furnishing efficient self-lubrication at any temperature without interfering with the heaviest conductive capacity.

This is due to the fact that its patented bushing of bronze gauze, impregnated with a graphite composition, is not insulated by oil or grease, so that the current can pass directly through it to the pin. This bushing will not run hot or burn out and is interchangeable.

Send for illustrated catalog

MORE-JONES BRASS & METAL CO.
ST LOUIS, U. S. A.

Peter Smith Electric Heaters Will Bring Winter Comfort to Massachusetts Folk

The Bay State Street Railway has recently ordered 3200 of these efficient cold-dispellers.

Have **you** ever paused to realize how comfortable car-heating can affect **your** winter traffic?

Do you realize what it means to the people in the scattered towns served by the Bay State to be able to run into the nearest city, perhaps even to Boston—how it enlarges their viewpoint and makes the winter months more endurable for them?

And how it can keep winter revenues from sagging?

If you do, you will do as the Bay State people did—you will put your heating problem up to the Peter Smith engineers.

Why not do it at once?

The Peter Smith Heater Co.
Detroit, Mich.
Heater Specialists for Thirty-five Years

PS HEATERS

PS HEATERS

7 THE POPULAR 7

Seven Points of Superiority contribute to the success of G-E Armature Coils

Seven has always been a popular number—there were seven wonders of the Old World, and the Ancient Church was built upon the Seven Hills of the Eternal City. There are seven days in the week, seven notes in music, seven colors in the spectrum and the span of man's life is 70 years.

Seven features are largely responsible for the sale, during 1916, of a trifle over 700,000 G-E Armature Coils. The omission of any one of these processes would mean **at least** a one-seventh depreciation in quality.

The seven important features are:

1. Shellaced insulation between turns.
2. Wrapped (not taped) with varnished cambric.
3. Taped with best cotton webbing.
4. Dipped three times } for perfect insulation.
5. Baked three times }
6. Steam moulded to absolute fit.
7. Leads dipped to prevent raveling of the insulation.

G-E Coils maintain the original high quality of G-E Motors.

General Electric Company

Atlanta, Ga.
Baltimore, Md.
Birmingham, Ala.
Boston, Mass.
Buffalo, N. Y.
Butte, Mont.
Charleston, W. Va.
Charlotte, N. C.
Chattanooga, Tenn.
Chicago, Ill.
Cincinnati, Ohio

Cleveland, Ohio
Columbus, Ohio
Dayton, Ohio
Denver, Colo.
Des Moines, Iowa.
Duluth, Minn.
Elmira, N. Y.
Erie, Pa.
Fort Wayne, Ind.
Hartford, Conn.
Indianapolis, Ind.

General Office: Schenectady, N. Y.

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Kansas City, Mo.
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Nashville, Tenn.

New Haven, Conn.
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New York, N. Y.
Niagara Falls, N. Y.
Omaha, Neb.
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Pittsburgh, Pa.
Portland, Ore.
Providence, R. I.
Richmond, Va.
Rochester, N. Y.

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San Francisco, Cal.
Schenectady, N. Y.
Seattle, Wash.
Spokane, Wash.
Springfield, Mass.
Syracuse, N. Y.
Toledo, Ohio
Washington, D. C.
Youngstown, Ohio

For Michigan Business refer to General Electric Company of Michigan, Detroit.
For Texas, Oklahoma and Arizona business refer to Southwest General Electric Company (formerly Hobson Electric Co.), Dallas, El Paso Houston and Oklahoma City. For Canadian business refer to Canadian General Electric Company, Ltd., Toronto, Ont.

6665

Electric Railway Journal

Published by the McGraw Publishing Company Inc.
Consolidation of Street Railway Journal and Electric Railway Review

Vol. XLVIII NEW YORK, SATURDAY, DECEMBER 9, 1916 No. 24

THE PREVENTION OF STRIKES

In his message to Congress on Tuesday, President Wilson very clearly explained the difference between the action of an individual in doing a legal thing, as to stop work, and the concerted action of powerful bodies of men to do the same thing and so stop the industrial processes of the nation. The difference, in our opinion, is obvious; in fact, it is the basis of all anti-trust legislation. Society is undoubtedly justified in safeguarding itself in some way from conspiracies of this kind. As for the remedy, Mr. Wilson seems to incline toward legislation similar to that embodied in the Canadian industrial disputes act when he recommends an amendment of the existing federal statute by which, if the present methods for mediation provided by it fail, a full public investigation of the merits of the dispute shall be instituted and completed before a strike or lockout may lawfully be attempted. The occasion of the recommendation was, of course, the existing dispute between the railway trainmen and the steam railroad companies, but the principle would be the same when any community, to use the words of the President, finds "the necessary processes of its very life" imperiled. We do not consider the Canadian industrial disputes act a panacea for all labor problems. The final solution lies in a recognition by both capital and labor that their interests have far more objects in common than in opposition. But for the protection of the community until this fact is realized, the adoption of some plan like that suggested by the President is most important.

WEBB BILL SHOULD BE PASSED

With constructive railroad legislation imperative, it is apparent that other legislation must indeed be of vital interest to the nation to be accomplished during the present short session of Congress. In view of this fact, it is very significant that President Wilson in his message this week saw fit to include in a special group of desirable legislation the Webb bill, which embodies the principle of co-operation among exporters, with due safeguards against unreasonable restraint of domestic commerce. Yet it is not difficult to understand why the President considers this bill of capital importance. What his railroad program means to our domestic welfare, the Webb bill means to our influence and prosperity as a world trader. Present international conditions have opened the eyes of Americans to the possibilities of international trade, but if they are even to hold the trade that has been turned to them, to say nothing of expanding the foreign trade of this nation as they should, they must be allowed to adopt with full legal sanction those practices of fair combination that have made other nations so successful in foreign trade. The need is urgent, and the time is opportune. The Webb bill has already passed the House of Representatives. It should be enacted by the Senate without delay, unless its members wish to prove that their minds are of a provincial type.

PRACTISING THE ART OF PUBLICITY

Generalizing on the subject of publicity amounts to nothing. In the electric railway field there has been a great deal such generalization but comparatively little action. We learn to do by actually doing things, and each opportunity to practice the art of publicity must be embraced, for no theorizing will ever teach it. Such an opportunity was forced upon the Public Service Railway of New Jersey by the recent political campaign. The railway was introduced as one among a number of issues and certain candidates endeavored to gain political capital by attacking it. The answer to this was an announcement occupying half pages in New Jersey newspapers last week, of which the text was reproduced in the issue of the Electric Railway Journal for Dec. 2, page 1171. No one has told us who wrote this advertisement, but all who are acquainted with President Thomas N. McCarter, whose name is signed to it, will readily accept him as its author. Its wording is fearless, implying a conviction of correct dealing and, regardless of consequences, it hits straight from the shoulder. The occasion was one which fully justified this treatment. Many so-called replies to similar charges in the industry have temporized with the situation, or the replies have been so feeble as to be negligible.

SPIKING THE POLITICIANS' GUNS

We believe in the expression of personality in things corporate as well as in individual affairs, and any attempt to straddle the issues listed by the politicians in the case cited above or to issue a feeble reply would have been worse than no reply at all. If the story of the railway is being told fairly, fully and intelligently to the public, any attacks made by politicians and demagogs will fail of their purpose. The Public Service Railway has a strong publicity department which has done good work and could do more. This answer of Mr. McCarter's is the most powerful blow that it has yet struck. We welcome this advertisement as typical of the awakening interest of the electric railway industry to publicity and as a harbinger of the time when its standing with the public will be commensurate with its real strength. The series of cartoons and talks on publicity now running in this paper is evidence of our convictions along this line. That the Public Service Corporation, of which the railway is a part, is aware of the possibilities of other phases of publicity is indicated by the splendid advertising copy which the Electric Company issued in connection with last Saturday's inauguration of floodlighting of the Statue of Liberty in New York Harbor, for which the company furnishes power.

THE OUTLOOK FOR HIGHER NET RETURN

The reception which has been accorded to the plea of the Boston Elevated Railway for some relief from its present financial burdens is encouraging, we believe, not only to that company but to others which have felt the pinch of a constantly decreasing amount of net return. The Boston investigation, which is now being conducted before a special legislative commission, is undoubtedly the most important study of the kind ever conducted in search of remedial measures.

As might be expected, opinions in Boston differ somewhat as to the best means of putting the company on a more stable plane of development. Opposition to an increase of fare above the 5-cent unit and to any substantial curtailment of free transfer privileges is substantially greater than objection to plans involving the sharing of some of the company's burdens by the municipalities in its territory, through reduced taxation of the road itself or through a scaling down of fixed charges in Boston proper in connection with the rapid transit lines. At least there seems to be a growing sense of responsibility on the part of the public for rapid transit improvements which are ahead, and a very general appreciation that the company has been persuaded to "go the limit" in the past in assuming the continuing burdens of subway, elevated and tunnel construction charges which are so important a proportion of its yearly outlay. That some co-operative reduction in these burdens may be secured seems now quite possible in view of the attitude of the public so far in the case, if the commission in its thorough study of the company's situation comes to what seems to us the logical conclusion.

The company laid its cards face upward at the opening hearing, and there is no question that the thinking public has been greatly interested in the admirable brief summarizing the company's financial history and requirements which were printed and distributed at the outset of the proceedings. The general recognition of representatives of the public that the special commission itself must bear the brunt of the investigation is coupled with an equally general opinion that the exact working out of the problem of granting relief must also be left chiefly to that tribunal, assuming that the commission finds the company's plea valid. The question in the minds of the public, so far at least, seems to be one of ways and means, and the company is reaping the reward of its frank public relations policy in the attitude of the various improvement associations, boards of trade, etc., that have come to the hearings. Wholly apart from the question of details these proceedings are significant of a spirit of co-operation which ought to make the work of the commission easier and the solution of the company's problem free from the handicaps of a less friendly public opinion.

INSULATING THE TRANSMISSION LINE

The transmission line insulator problem seems to be a live one with interurban railways at present. This is true because of the increasing demand on the part of the public for continuity of service, the number of insulator replacements necessary each year and the increasing cost of new insulators. Many of the interurban transmission systems were built with the decade ending in 1907—the heyday period of electric railway promotion—and now the effects of the ravages of time are beginning to be apparent. When installed the insulators used on these lines were no doubt considered as of the first quality, but in both electrical and mechanical strength they were, as a rule, even when new, by no means the equals of carefully designed and manufactured modern insulators. In the early days the requirements of electrical porcelain were not as well known as they are at present, nor was as much attention given to the various ceramic processes involved in insulator manufacture.

Experience has shown that insulator deterioration has been caused largely either by the gradual absorption of water or by cracking due to mechanical stresses, the latter being the result of poor design and faulty manufacturing methods. In addition to these causes of failure within the insulators themselves, the decay and deformation of the supporting structures have further increased the mechanical stresses which the insulators have been called upon to withstand. Moreover, the increased power loads have tended to magnify the surge voltages which result from accidental grounds, insulator breakdowns and faulty switching, and therefore the electrical stresses imposed on the insulators. The present situation is that, on some roads at least, the matter of insulator replacements is assuming considerable importance.

The problem as it now confronts the railways presents two phases: the detection of defective insulators now in service, and the selection of a proper type of new insulator for replacement purposes. The continuity of service afforded by a line and the annual maintenance costs thereof reflect very closely the success with which the problem is being solved in a given instance. Both of these factors affect the net earnings of a railway, and the first named may be of some importance in its influence on relations with the public. It seems to us, therefore, that the insulator problem is one which well merits careful consideration by railway officials. In solving this problem they may well profit by the recent work of the technical societies which have been successful in bringing together the experts among the users and the manufacturers. These societies have proposed standard specifications which should prove a valuable guide in the selection of new insulators for a given service.

Getting the Employees to Help

Employees Who Do and Who Do Not Help Make the Company Popular

DISAFFECTED and disgruntled employees can tear down faster than any means of establishing good public relations can build up.

It is of no avail to insist that this should not be the case, because it IS the case.

And this being so, it is evident that good treatment of and being on good terms with platform men are very important factors in making publicity work effective.

If most of the public is "against the railroad" this feeling reacts on the employees.

They absorb the hostile virus, and, once infected, pass on the disease to those with whom they come in contact.

No one does much riding on electric railways without hearing passengers and conductors or motormen knocking the company to their mutual satisfaction.

This is a bad noise to hear in the machinery of any organization.

It is as easy as lying to fine and fire men for criticising the company; too easy to accomplish any good.

What is needed is the creation of such an attitude on the part of employees that they will stand up for the company instead of criticising it or agreeing with anyone else who does so.

Good treatment of employees is the only way to get good treatment from them.

The usual kinds of welfare work are admirable, but rest-rooms and pensions will not take the place of good wages and a voice—a chance for a man to get his grievances off his chest.

And, then, too low wages and too many long-swing runs or other grievances make an employer hardly less unpopular with the general public than with the employees immediately concerned.

When a company is giving its employees a square deal the public does not often know it, with the result that in case of trouble sympathy is all with the men.

Here is ANOTHER chance for the publicity man.

In one Eastern city where strikes had formerly been almost as regular as Washington's birthday an attempt by a small fraction to pull out the men recently fell flat, largely because the company has in later years done well by its men, and the people knew it.

Where a few years ago the men were almost incited to strike by popular opinion, this year they were told not to make fools of themselves and they didn't.

Late repentances and dashing into print just before and after a strike call has gone out cannot accomplish much.

Good relations with employees, like good relations with the public at large, are plants of careful cultivation and slow growth. The publicity man can make the plant grow faster and let people see it growing.

Remodeling a Small Railway Power Plant

Holyoke Street Railway Power Plant Lately Enlarged by Reconstruction of Boiler House and Replacement of Two Small Generating Units by Large Engine-Driven Set—Modernized Coal-Handling and Condensing Systems a Feature

Holyoke Power Plant—General Exterior View Showing Coal-Handling Crane, Coal Tower and Base of New Chimney

THE power plant of the Holyoke (Mass.) Street Railway has recently been reconstructed to meet increasing demands on the company's generating capacity, following a comprehensive study of the general power situation by the road's consulting engineer, G. E. Pellissier of Springfield, Mass., who drew the plans and supervised the installation of the equipment. The original plant had a rated capacity of 2650 kw. with five reciprocating engine-driven units, all generators being of the direct-current type with the exception of a motor-driven outfit of 75 kw. not included in the above and used in connection with the lighting of Mountain Park, a summer resort about 5 miles from the station. The plant now has a rating at the direct-current buses of 3550 kw., an increase of about 34 per cent in capacity having been secured by the removal of two 300-kw. units driven by 15-in. x 28-in. x 48-in. Greene tandem compound engines installed in 1895, and the substitution of a 1500-kw. generator of the interpole type, direct connected to a 30-in. x 60-in. x 54-in. Rice & Sargent horizontal cross-compound engine.

Besides the changes in prime movers above outlined, the boiler plant of the station has been remodeled, new and larger units replacing old equipment. A Taylor stoker installation and a Stephens-Adamson coal-handling system have been put in, a new chimney built, and improvements effected in the feed water supply and condensing systems. These are reviewed below, following an outline of the power problem of the company, based upon a report by its consulting engineer.

Reasons for Adhering to Direct-Current Generation

The street railway service of Northampton and Amherst is under the same management as the Holyoke company, and the power requirements at these points affected the development problem at the Holyoke station. The load of the Holyoke plant is nearly all located within about 4 miles of the station and the existence of other companies on the boundaries of the system offers little opportunity for expansion into the outlying country. From the distribution standpoint, the continued use of direct current appeared desirable. One of the plans considered was the installation of a 2000-kw. turbo-alternator at Holyoke for the supply of power to the Mountain Park and Amherst lines, with the erection of a substation at each point. It is a disadvantage, however, that the park is open only about four months in the year, and that for only a small part of that time is the power consumption large, while the fixed and operating charges would run the entire year with this arrangement. It was found to be undesirable, also, to transmit energy from Holyoke to Northampton, the existing cost at the steam plant of the Northampton Street Railway in that city not being enough higher than that at Holyoke to warrant the supply of a.c. power from the latter station.

Assuming that the Holyoke station was enlarged sufficiently to carry the Amherst and Mountain Park loads through substations, and that a 2000-kw. turbo-alternator was installed, it appeared upon analysis that in order to work the turbine at anywhere near full load it would be necessary to throw a part of the Holyoke load upon this unit. The maximum demand at Amherst and Mountain Park would probably not exceed 85 per cent of the output of this machine, and for the greater part of the year would not exceed 25 or 30 per cent of its capacity. To carry a part of the Holyoke load on the turbo set it would have been necessary to install transformers and either rotary converter or motor-generator equipment at Holyoke in order to obtain 550-volt direct current. The addition of these extra units would have made the floor space occupied at Holyoke about the same as though the extension of the plant were made along reciprocating engine lines. As regards efficiency under the best conditions, viz., constant full load, there appeared little to choose between turbine and engine sets, and in view of the losses in conversion and transformation, any possible increase in efficiency by the use of the turbine would have been more than offset.

HOLYOKE POWER PLANT—COAL POCKETS, TRACK HOPPER, RECLAIMING CRANE AND TOWER OF COAL-HANDLING SYSTEM

HOLYOKE POWER PLANT—FUEL ECONOMIZER, RESERVE BOILER FEED PUMP AND OTHER BOILER ROOM AUXILIARIES

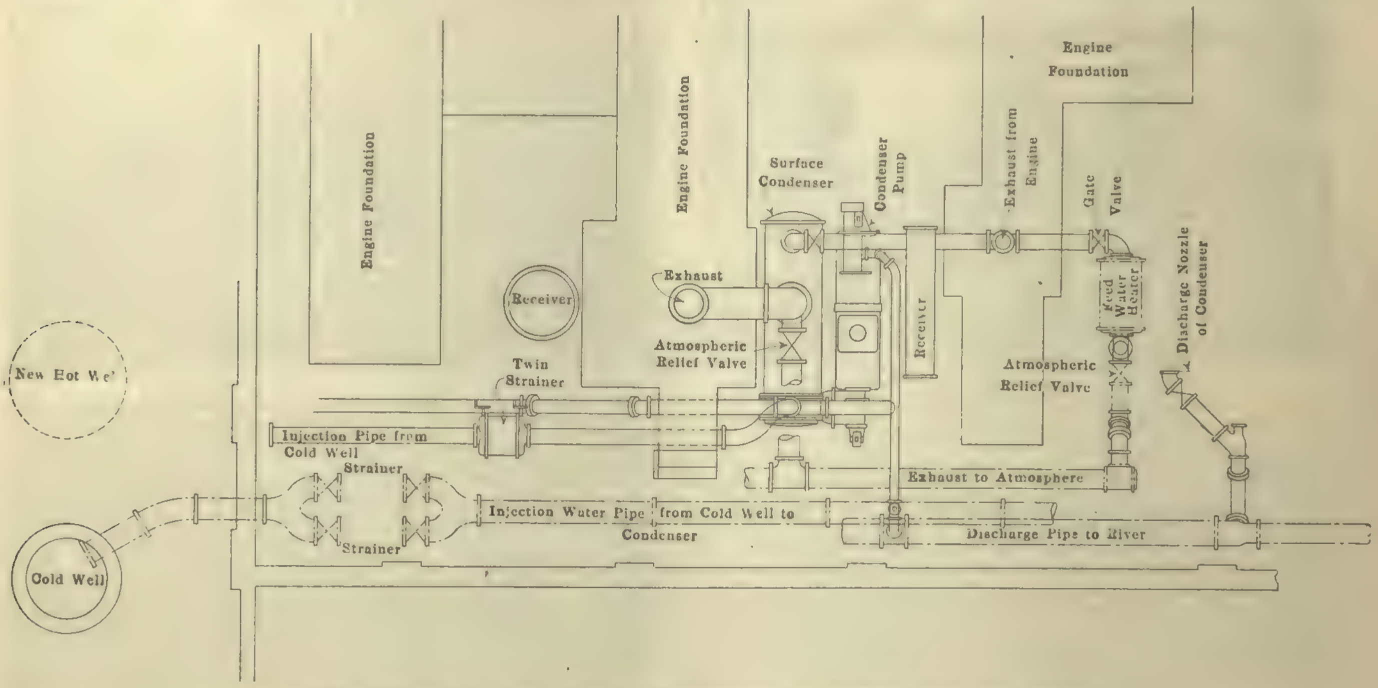
With the use of a single turbine the reliability of service in the districts supplied by it would not be as high as on the lines supplied by the various engine-driven direct-current units, and the cost of duplicate a.c. units and transmission lines would have been prohibitive. Accordingly, it was decided to purchase power at Amherst from the Turners Falls Power & Electric Company, installing a motor-generator substation at that point, and the Holyoke station was reconstructed along purely direct-current lines, accompanied by a general overhauling of the feeder system.

FROM COAL PILE TO STOKER

Run-of-mine bituminous coal is used at the Holyoke station. Fuel is either dumped or unloaded from coal cars outside the building for storage in the yard or deposited in a 12-ft. x 12-ft. steel track hopper, which is the beginning of the coal-handling system. A 5-ton Northern electric crane with a span of 60 ft. 6 in., equipped with a 1.5-cu. yd. grab bucket and operator's cage, facilitates handling fuel in the yard. From the track hopper the coal is drawn by an "S-A" reciprocating plate feeder, driven by a variable-throw eccentric which regulates the flow of coal. A 24-in. x 24-in. "S-A" double-roll coal crusher, driven by a 20-hp. motor, receives the fuel from the feeder, reducing it to 2-in. lumps and under, the crusher being driven by a 20-hp., 550-volt, direct-current motor. From the crusher coal is delivered to an "S-A" vertical bucket elevator, 53 ft. on centers, equipped with 14-in. x 18-in. buckets having a capacity of 40 tons per hour. The fuel is elevated to a sufficient height to permit the use of gravity in handling the coal in the remaining steps toward the stokers. From the discharge of the bucket elevator the coal is spouted through a bifurcated outlet to a suspension type bunker of 150 tons capacity. From the bunker the fuel falls through three "S-A" rack-and-pinion slide gates operated from the boiler room floor by hand chains. A powerful leverage is secured by the use of the rack and pinion design, and this, combined with the fact that the gate cuts into the fuel at right angles to the flow, makes operation unusually easy.

The connecting link between the storage bunker and the stokers is an "S-A" traveling weigh hopper. This

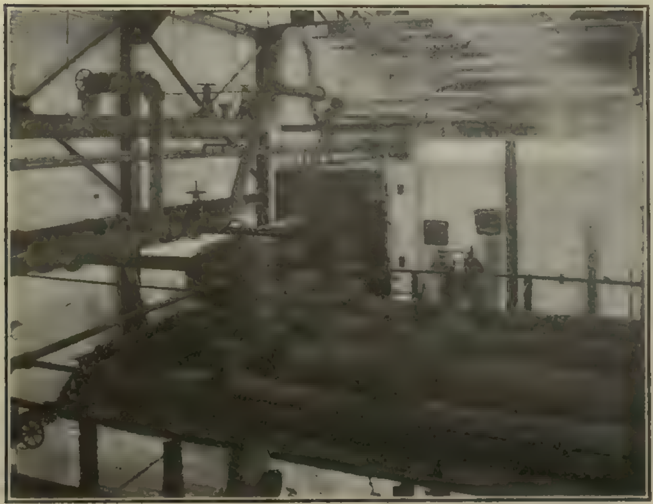
HOLYOKE POWER PLANT—FIRING AISLE IN BOILER ROOM; STOKERS, WITH ONE OF THE DUPLICATE STOKER ENGINES AND ONE OF THE DUPLICATE STEAM TURBINE BLOWERS FOR FORCED-DRAFT SYSTEM device serves to provide accurate operating records as well as to distribute the fuel. Thus the storage bunker did not require extending the length of the boiler room, being conveniently located so as to be filled by a single elevator and gravity chutes. In operation the desired quantity of coal is drawn from the bunkers, accurately weighed and recorded, and the hopper is moved and the coal discharged to any one of the stokers.



HOLYOKE POWER PLANT—PIPING CONNECTIONS IN ENGINE EXHAUST SYSTEM

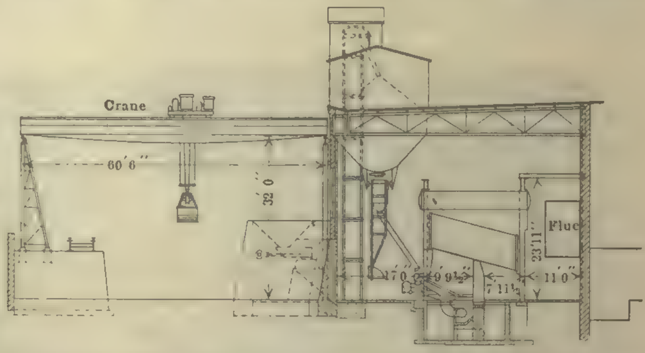
STEAM-GENERATING EQUIPMENT

Four new 500-hp. Babcock & Wilcox boilers equipped with six-retort Taylor stokers supply the present steam requirements of the plant. Three hand-fired Babcock & Wilcox boilers of 200-hp. rating each are held in reserve from the old steam-generating equipment. The new boilers replace one 307-hp. and two 342-hp. units of the hand-fired type, which were removed in the reconstruction work. A new brick stack of the Alphons Custodis type, 10 ft. in inside diameter and 175 ft. high, has been erected, and a new Greene fuel economizer, twelve tubes wide and fifty-two tubes long, with 12-ft. tubes, has been installed, replacing an economizer with 9-ft. tubes, six tubes wide and fifty-two long. Both stack and economizer are designed for a maximum boiler rating of 3000 hp.



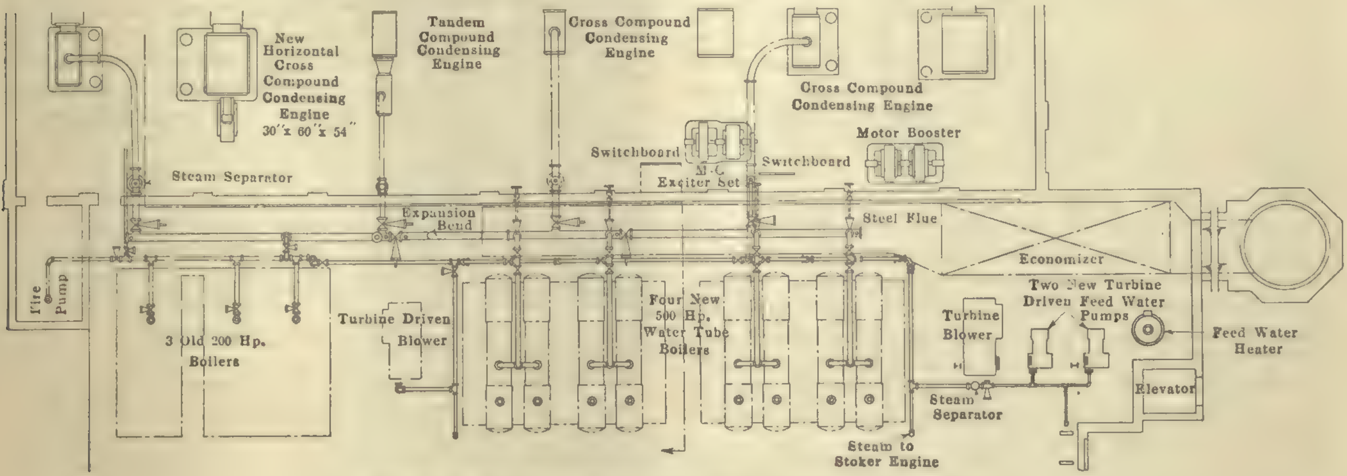
HOLYOKE POWER PLANT—LIVE STEAM PIPING IN BOILER ROOM AS SEEN FROM CHIEF ENGINEER'S OFFICE

An air supply of 50,000 cu. ft. per minute for the furnaces is provided by two Sirocco blower sets, each direct driven by a 136-hp. Terry steam turbine running at 1640 r.p.m. normal speed. Either set is sufficient for the requirements. Two stoker engines, each 6 in. x 6 in., of the American Blower Company's make, are installed, and the speed of the blowers and engines is automatically controlled by a Mason regulator, which also governs the damper opening. Special care has been taken in the design of the air supply ducts to provide as short connections as possible between the main duct and the wind boxes, corners being rounded to reduce friction when feasible. The main duct is located behind the bridge wall, and the connections to each furnace are flared and cast-iron elbows employed, as shown in the accompanying illustration, the intakes making an angle in each case of about 40 deg. with the axis of the air duct. The economizer is by-passed by a duct carried under the floor from the end of the flue nearest the stack to an uptake discharging into the stack inlet at the north end of the boiler room, the usual dampers being provided.



HOLYOKE POWER PLANT—CROSS-SECTION OF BOILER ROOM AND OUTDOOR COAL STORAGE

Feed water is normally taken from a hot well outside the station, an auxiliary city connection being provided for emergencies. The new condensing installation is of the surface type, the circulating water discharge being carried into this well and serving as a boiler supply. Water from the Connecticut River is used for the circulation supply, the latter being taken into a cold well outside the plant by gravity flow from the river. Three suction lines from this well lead to the condenser sets, strainers being installed in the leads in each case. The new condensing equipment was supplied by the C. H. Wheeler Manufacturing Company of Philadelphia, Pa. The feed water is normally handled by either of two 4-in. Jeansville three-stage horizontal centrifugal pumps, each direct-connected to a Terry steam turbine operating at 3000 r.p.m., and located in the boiler room basement. One Deane feed pump used with the former station equipment is held in reserve, and a Deane fire pump is in service, the latter being piped for feed-pump work in emergencies. Water taken from the hot well at 100 deg. Fahr. passes through a feed pump into a 2500-hp. National closed heater, through which steam from the auxiliaries is passed. Leaving the heater at 205-210 deg. Fahr., the water temperature is then raised to 270 deg. Fahr. in the economizer, thence entering the boilers. A 5-in. Venturi meter, with extra 2-in. throat to measure feed water during the night when the load is very light, is installed in the feed water main piping, with dials and recording mechanism in the office of the chief engineer, C. L. Sheldon.


New Horizontal Cross Compound Condensing Engine 30″ x 60″ x 54″
Tandem Compound Condensing Engine
Cross Compound Condensing Engine
Cross Compound Condensing Engine
Motor Booster
Switchboard
M-G Exciter Set
Switchboard
Steam Separator
Expansion Bend
Steel Flue
Economizer
Fire Pump
3 Old 200 Hp. Boilers
Turbine Driven Blower
Four New 500 Hp. Water Tube Boilers
Turbine Blower
Two New Turbine Driven Feed Water Pumps
Feed Water Heater
Elevator
Steam Separator
Steam to Stoker Engine

HOLYOKE POWER PLANT—LIVE STEAM PIPING CONNECTIONS

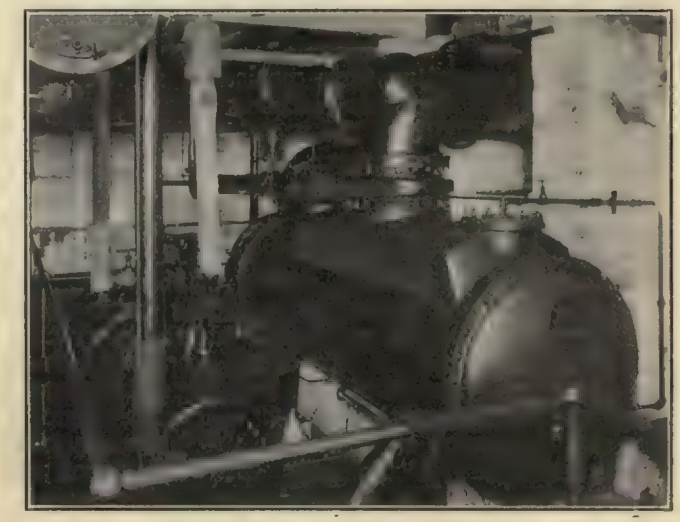
Without the mechanical stoker installation it would be necessary in this plant to operate three or four boilers, whereas with the present installation two boilers are sufficient for all the steam requirements. About 25 tons of bituminous coal are burned per day in the plant under normal load conditions, but in the summer and winter peaks about 30 tons are burned. The use of stokers and of the automatic coal-handling system has enabled the operating force in the station to be reduced from a former total of eighteen men to a present total of fourteen. The various improvements have also reduced the fuel consumption from an average of about 3.5 lb. per kilowatt-hour before the changes were made to 2.3 lb. per kilowatt-hour at switchboard, which includes steam for auxiliaries.

Ashes are at present dumped from the grates upon a concrete shelf in the boiler-room basement. A passageway is provided at one side of this shelf and equipped with a narrow-gage track upon which ash cars can be operated later to a hoist for yard delivery. About 12 per cent ash is obtained in the present fuel combustion, all ashes being weighed.

FROM BOILER TO HOT WELL OR SWITCHBOARD

At the rear of the boilers and about their settings are carried two live steam headers, one 10 in. in diameter for prime movers and a 5-in. auxiliary line. The two headers are cross-connected at various points, and the steam delivery lines from the boilers are 6 in. in diameter in the cases of the new units and 5 in. in diameter in the older installation. Short connections with a gate valve in each are carried through a fire wall between boiler and engine rooms through separators to the corresponding engines, with the customary expansion bends. The steam connections to the auxiliaries are made as short as possible.

HOLYOKE POWER PLANT—ENGINE ROOM IN RECONSTRUCTED PLANT



HOLYOKE POWER PLANT—SURFACE CONDENSER WITH AIR AND CIRCULATING PUMPS

Besides the Rice & Sargent engine, the engine room contains a 15-in. x 28-in. x 48-in. Greene tandem compound engine direct connected to a 300-kw. generator; a 26-in. x 50-in. x 48-in. Hamilton cross-compound engine direct connected to an 850-kw. generator, and a 30-in. x 60-in. x 54-in. Pennsylvania Corliss cross-compound engine direct connected to a 1200-kw. generator. The Greene and Hamilton engines have been rebuilt to operate at 150 lb. pressure, these outfits formerly having been designed for 125 lb. The main generators are 550-volt General Electric multipolar railway type direct-current machine. The Greene and Hamilton engines operate at 100 r.p.m., the Pennsylvania Corliss at 90 r.p.m., which is the speed of the Rice & Sargent engine. The last named is designed with cylinder ratios which will permit its operation in connection with a low-pressure turbine if further expansion of the station becomes necessary along alternating current lines. The electrical equipment of the engine room includes the usual railway type direct-current switchboard, with General Electric equipment throughout and a 120-kw. General Electric booster with a maximum rating of 450 volts and 310 amp., used in feeding the Amherst line. The Mountain Park lighting service is handled by 2300-volt, 60-cycle energy supplied by a motor-generator of 75-kw. rating previously mentioned. Overhead feeders supply the distribution system.

As stated, C. H. Wheeler surface condensers are used in the remodeled station, these being installed in the engine room basement and so arranged that a pair of engines can be exhausted into each if desired, or two of the engines can be operated on surface condensers and the other two on the Deane jet condensers left over from the old installation. The Rice & Sargent engine exhausts into a surface condenser equipped with a 16-in. x 32-in. "Rotrex" air and vacuum pump, and a No. 10 centrifugal pump, direct driven by a 9-in. x 8-in. vertical engine. The Greene engine adjacent to this unit may be exhausted into the surface condenser or into a jet condenser. The Hamilton engine exhausts into a surface condenser with a "Rotrex" air and vacuum pump of the foregoing size, but provided with a No. 8 centrifugal pump and an 8-in. x 8-in. vertical engine. All of these units may be exhausted into the atmosphere if necessary. A 28-in. vacuum or better is readily obtained with this installation. All the condensate from the engines is discharged into the river below the plant through a discharge well piped to the channel and connected with the hot well by an overflow line leading from the latter. The utilization of circulating water after its passage through the condenser tubes is highly advantageous in connection with the feed water supply. A closed circuit oiling system with White Star filters in the basement is in service.

The station operating force consists of a chief engineer, three watch engineers, six boiler room attendants, three oilers, a repairman and a coal assistant.

According to a report compiled by Harry P. Coffin, chairman of the Public Safety Commission, Portland, Ore., two people were killed and forty-six injured in traffic accidents in Portland, during October. Failure to comply with city ordinances regarding traffic violations caused offenders to pay $1,562 into the city treasury during the month. A total of 171 people were fined for violations of the speed laws and other ordinances, ninety-eight were continued for sentences, nineteen warned, 116 paroled by captains, thirty-one dismissed and six sent to the juvenile court. Three men were sent to jail for breaking the speed laws and three escaped after they had been arrested by officers.

Some Phases of the One-Man Car Question*

The Author Discusses Design and Equipment, Operation at Steam Railroad Crossings and Methods of Introducing One-Man Operation

BY C. D. CASS
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IT is particularly to some of the variations in methods of operation and character of one-man cars that this paper is devoted. First, as to the character of the cars, it may be said that some lines have found it impossible to purchase new equipment and have been compelled to rebuild old equipment. The controlling idea in the designing of new equipment or the rebuilding of old, of course, is the entrance and exit of passengers through the front vestibule past the operator. On old equipment in some cases it has been found impossible to provide a large enough entrance to permit of entering and alighting at the same time. A large entrance is a desirable feature of one-man cars, and its absence causes complaints from the public.

In all cases it is necessary to provide a door-opening mechanism to be controlled by the operator, and a fare-collecting scheme also under the control of the operator. Very satisfactory results have been obtained with manual mechanical contrivances for door-opening mechanisms, and on our small road these have been put on at a nominal cost and have been fairly satisfactory.

The near-side stop, of course, is desirable. Rear doors are closed and locked in such a manner as they cannot be opened from the outside. Some state commissions have required companies to furnish emergency exits in the rear of the car controlled by the operator. In other states this has not been required, and it has been found sufficient to provide at the rear doors a locking device which can be operated readily in an emergency by the passenger. In building new equipment for one-man car operation perhaps the Illinois Traction Company has been the most successful in obtaining car designs that meet the fancies of the public most completely. New cars have been designed by the mechanical department of the Illinois Traction Company which operate the doors and steps by pneumatic engines and the cars are completely equipped with air brakes and sanders. In my opinion these one-man cars are the best designed for the purpose in the United States, and inasmuch as the Illinois Traction Company is represented on your membership, I suggest that further details of the design of these cars be obtained from that source.

Now concerning operating features: Probably the most discussed subject, and the one on which there has been the greatest variation of opinion, has been the method of operation over steam railroad grade crossings. I find almost as many methods in use at steam road grade crossings as there are companies operating one-man cars. Some companies provide flagmen at the crossings, the wages for such flagmen being paid either jointly by the steam and electric company or else wholly by the electric company. Other companies require the operator of the car to flag himself across steam road crossings, and various other methods are being used. This was the one subject in my particular case which required the most courage to handle. I contend that the flagging of a steam road crossing by a conductor on a two-men car has resulted in increasing the hazard of operation over steam road crossings. The theory on which this method was built was perhaps correct, but the element of human fallibility was not given sufficient weight in arriving at the solution of the problem. It is the old story of divided responsibility increasing the hazard. With this in mind when we started our one-man cars, the plan inaugurated was for the operator of the one-man car to bring his car to a full stop just in the clear of the steam road crossing, and then with the entire weight of responsibility upon him, if the crossing was clear, he could proceed in safety. He did not depend upon a conductor or anyone else; he knew the responsibility rested solely upon him, and with us it has proven itself safer than the old plan of the flagging of the crossing by the conductor.

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*Abstract of a paper presented before the Chicago meeting of the Illinois Electric Railway Association, Nov. 28, 1916.

I reached the conclusion of permitting operation in this manner after considering the operation of motor car traffic and team traffic over railroad crossings. It was apparent to me that there was no more reason why the operator of a street car could not cross a steam road crossing safely than the operator of an automobile could cross such crossing safely. And with the additional precaution of requiring a full stop, which is not required of automobiles, I felt that safety was completely secured. It has been contended that the electric railway should join the steam railway in providing safety signals, crossing gates, crossing flagmen or some other safety precaution. I take issue with anyone advocating this for the following reasons: First, all the courts in the land have held times without number that a street car is a part and parcel of the ordinary traffic of a city street, and this being true, there is no more reason why an electric street car line should be required to pay for protection at a steam road crossing than there is for an automobile owner or a taxicab owner or the owner of any other vehicle to be required to pay for such protection. I maintain that if means for protection are required at a steam road crossing to safeguard street car traffic, then means for protection are required to safeguard vehicle traffic of all kinds, and in that case it is the duty of the steam road that creates the hazard to protect the public against such hazard. In case the hazard is apparent to all, it must be equal in extent to all using the crossing, and the parties responsible for creating the hazard should be responsible for the elimination of it.

One more phase of this subject is the attitude of the public and the necessity of careful planning before the inauguration of one-man car service. In a city that has become accustomed to street cars manned by two men, the advancement of the one-man car idea is apt at first to be received by the public with intense hostility. This is perfectly natural, first, because of the habit of seeing two men on cars; second, on account of the sympathy of the public with the men displaced by one-man operation, and third, in our particular case, an issue was required for a municipal election just at that time, and the one-man car subject was immediately available and peculiarly popular.

Experience, despite the advancement of education, remains always the best teacher. It will be found that schedules must be slightly lengthened. The problem of transfers and trip reports must be carefully solved. For those companies that can afford it, new cars designed for one-man operation are to be recommended. More frequent service on thinly served lines will help in a large measure to pacify the public. If these things be kept in mind and the foundation for one-man service be built with a frank, open statement concerning its necessity, there should be no difficulty in obtaining in advance the sanction of a fair proportion of street car riders, and when the system has been installed and is working smoothly you will find that the traveling public will be entirely satisfied and that you have offset to a very large extent the unhealthy condition of your street car revenues.

Modern Requirements Fulfilled by One-Man Cars*

The Author Cites Operating Records for One-Man Cars on an Important Line in the City of Fort Worth, Tex.

BY C. H. BECK
Westinghouse Traction Brake Company, St. Louis, Mo.

IN the following paragraphs, which deal with the operation of light-weight units controlled by one person, the name "safety car" has been adopted for such units. To those who have become closely associated with the operation of such cars, it has appeared important that the term "one-man car" should be discarded, for the reason that, in the first place, it does not especially distinguish the car, since the operation by one man is only, after all, one of a number of important features. Also, the term gives rise to the suggestion that a great number of men are to be turned out of work, and is, therefore, likely to prove unpopular.

It has been the writer's pleasure to have been associated with the introduction of ten cars of this type to service on an important residence line in the city of Fort Worth. The question of adaptability of such a car has never been seriously doubted, so far as its application to small lines is concerned, but the instance referred to is one in which such cars were placed in operation on a first-class line. The cars were of the double-end type and weighed 12,500 lb. They were so equipped that the brakes, as well as the doors and steps, were controlled from a single valve handle. Furthermore, a safety element was combined with the operation of the controller through a device similar to the well-known "dead man's handle."

Under this arrangement the braking positions are in no way complicated by the addition of door-operating ports, and the stop is accomplished in almost exactly the same manner as has been the standard practice. After the stop is made, a simple movement of the same handle is all that is required to open the door and step. When the work of unloading and loading has been accomplished, a movement of the same handle in the opposite direction, closes the door and step and releases the brake, and the car is ready to proceed.

The service previously given on this line was fifteen-minute headway in non-rush hours and seven and a half minutes in rush hours, the original type of car being a double-truck, double-end car, having a seating capacity of forty passengers. The physical characteristics of the line are such as would constitute a most difficult problem for making experiments, for the reason that the line is of single-track construction with a great number of switches and curves and with practically no level track. The length is 3.32 miles, making a round trip of 6.64 miles. The running time for round trip was forty-five minutes, thus making an average schedule speed of 8.8 m.p.h. The average number of passengers handled per day was 3860.

With the safety cars a non-rush-hour service of ten-minute headway and a rush-hour service of five-minute headway was installed, thus reducing the headway by one-third or, on the other hand, increasing the car service 50 per cent. The time for round trip was reduced to forty minutes, making an average schedule speed of 9.9 m.p.h., or an increase of 12.7 per cent. The number of passengers for the first fifteen days of operation of the safety cars averaged 4510, or an increase of 16.8 per cent. The increase in car mileage was practically 50 per cent and, as would be expected under the circumstances, the receipts per car-mile decreased.

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*Abstract of a paper presented before the Chicago meeting of the Illinois Electric Railway Association, Nov. 28, 1916.

By means of a meter at the substation, it was found that the old cars were operated on a basis of 2.4 kw.-hr. per car-mile, and by the same means it has been discovered that the new cars are being operated on the basis of 1 kw.-hr. per car-mile, with prospects of slightly reducing the cost of operation of the new cars after the men become familiar with the operating conditions. The figure on the power consumption, of course, includes line losses in each case. With respect to the question of power consumption generally, it has been found that the safety cars are being operated under a 25 per cent reduction in total kilowatt-hours per day, as compared with the old type of car, notwithstanding the improvement in service amounting to 50 per cent increase in car-miles per day.

The volume of patronage on this line is distributed in such a manner that a peak load is created in the morning and evening, with the greater peak, of course, coming in the evening. It has been observed in this connection that the peak is not an instantaneous affair, but is fairly well distributed over a period of twenty-five or thirty minutes. Under the five-minute headway the maximum loads were observed to have been less than was the case under the original seven-and-one-half-minute headway, as might have been expected, but were not of such great proportions as to fill the safety car uncomfortably, although it seats only twentyeight passengers.

The cars have been controlled by one operator from the beginning of the service, which was Nov. 1 of this year, and as may be inferred from the increase in average schedule speed, no difficulties have been encountered with respect to making change or issuing transfers. As a matter of fact, a study of the data given will reveal that the operation has been a complete success from every point of view, and has carried with it all that could be desired from an operating standpoint.

The time of boarding and alighting for any given number of passengers up to ten and twelve was carefully observed in connection with the operation of old cars. While the new operation has not been established for a sufficient length of time to assure that the majority of patrons are well familiar with its arrangement, at the same time such observations as have been made indicate that the time for boarding and alighting in this case will appear almost as favorable for, say, one or two passengers, and will appear more favorable for a greater number of passengers. A remarkable condition was found in checking the new car service, in that the traffic is more evenly distributed and, as might have been expected with the improvement in car service, the total number of passengers boarding and alighting at any point is much less than with the cars operating under the longer headway.

With respect to the car operators, these men were chosen from among the regular force, some having previously been conductors, some motormen and some both. It became apparent that those who had operated both ends of the car previously, and therefore were familiar with not only running the car but handling change and transfers, were able to attain a great degree of proficiency in the new operation very quickly. Those who had not enjoyed experience in both directions, however, readily adapted themselves, and within a remarkably short time all were able to make the schedule, and at this time, after twenty-four days of operation, they are apparently just as enthusiastic and well pleased with the new form of service as are the patrons and officials of the organization.

Since no loops are provided at the end of the line, it is necessary to change ends of the car, and arrangements are now under way to provide two trolleys per car, so that it will not be necessary for the operator to leave the car at any time.

Under the old system of operation, the fact developed that the northbound traffic (toward the center of the city) was only 85 per cent of the southbound traffic. This indicates a great possibility that a considerable number of patrons were being carried toward the city by other means of conveyance, probably by their friends who owned automobiles. Since the advent of the more frequent service, the ratio has increased considerably until it is now nearly equal as between the northbound and southbound traffic. This means that the prospective passenger is being provided with a service such that long waits on street corners are not necessary. As a matter of fact, under five-minute headway there is a car in sight nearly all the time. The line on which the safety car service was started had not previously been served by jitneys.

It is to be remembered that the cars are of single-truck type, but they have been found to ride as easily as double-truck cars. The only reason that can be assigned to this most desirable feature is that they are of extreme light weight and that the effect of momentum at low joints, switch points, etc., is not so great as with the old type of single-truck car. The acceleration is considerably greater than that experienced with the older type of car.

Government Operation Is Defective

Representatives of the Merchants' Association of New York City will appear before the Newlands investigating committee in Washington, D. C., to oppose Government ownership of public service corporations. The association has issued in pamphlet form the arguments which it has instructed its representatives to offer the committee. In this pamphlet the association says that the fundamental defects of Government operation are:

1. Dilatory, inconsistent, vacillating, and therefore ineffective and wasteful policy.
2. Unsuitable, inefficient, and frequently changed executive organization.
3. Hampering limitations upon executives.
4. Lack of self-interest as an incentive.
5. Lack of standards of efficiency.

Continuing, the association says:

"The fundamental assumption which underlies the argument for government ownership and operation of public utilities is that a profit equal to that now secured by private corporations through private operation can be secured for the public benefit by public operation; or that, as an alternative, by the elimination of profit, service may be increased or charges reduced. This implies that public management will be as economically, efficient and productive as private or corporate management. This assumption is unwarranted. On the contrary, it can be shown that government management is fundamentally defective in important particulars; that its defects are inherent in and inseparable from our system of government, and that these defects make relative inefficiency and lack of economy inevitable."

One of the first steps toward the centralization of work and departments in the Kansas City (Mo.) Railways is the reduction in districts for roadmasters from five to three.

$96,371,300 Expenditure by 1926 Recommended for Chicago Traction

Report of Chicago Traction & Subway Commission Includes Plans for Subway Construction for Rapid Transit and Surface Cars Through Central Business District, Conversion of Present Elevated System Into Completely High-Speed Express System and Extensive Rearrangement of Traffic in Loop District

[The report of the Traction & Subway Commission of Chicago, insofar as the general plan is concerned, has been given out to the press, although it will be three weeks or more before it will be ready in its entirety to submit to the City Council. This premature publicity of the general scheme in advance of the completion of the great mass of supporting data and information, and in advance of the financial plan, is precipitated through a so-called "scoop" of an unscrupulous Chicago daily newspaper. The engineering studies, which are most unique and exhaustive in nature and form the background for the conclusions in the general plan described herewith, will appear in these columns as rapidly as they take final form.—EDITORS.]

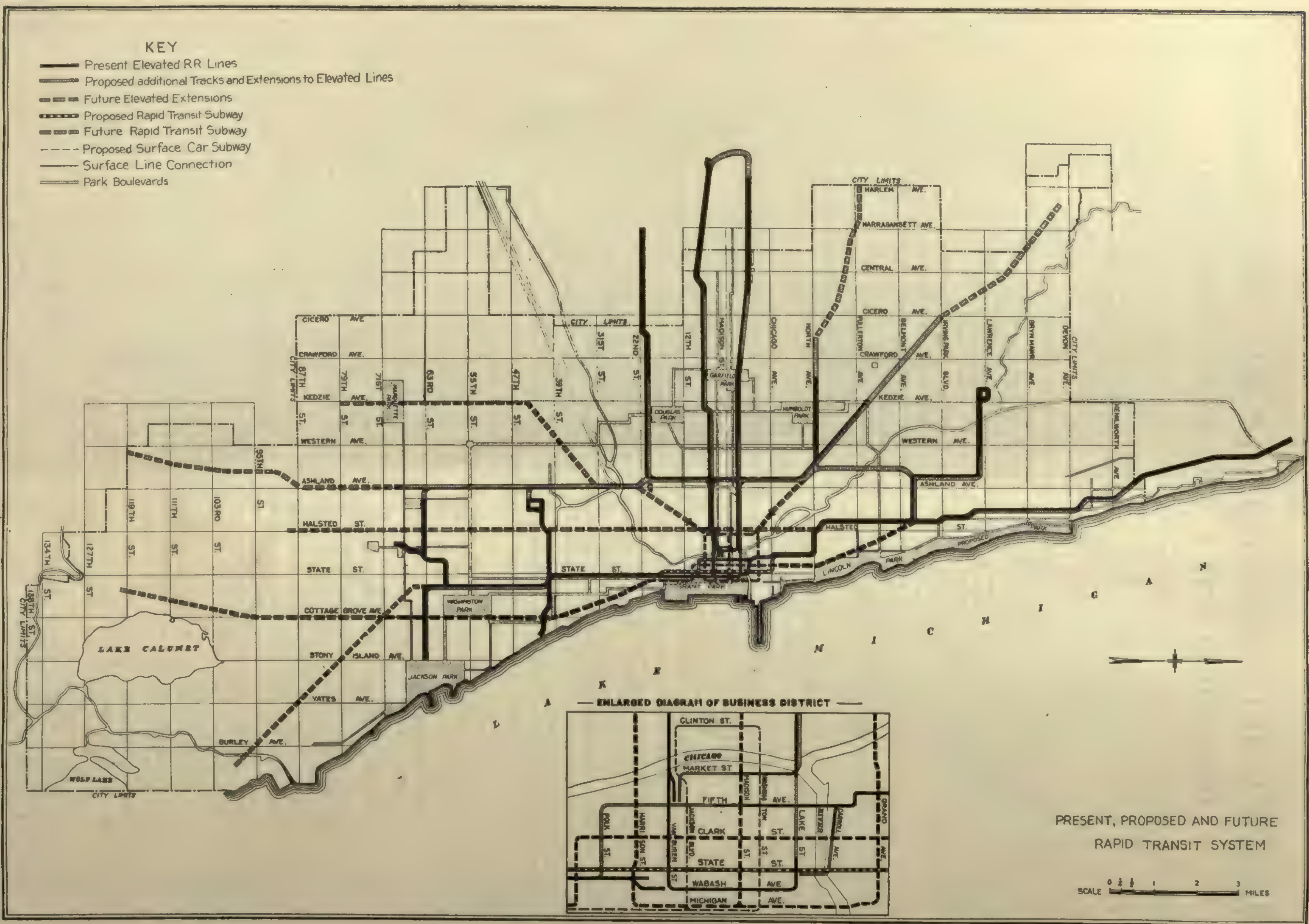
APPROXIMATELY $100,000,000 is the estimate of the cost of providing the city of Chicago with an adequate rapid transit system and relieving the congestion in the central business district, as developed in the report of the Chicago Traction and Subway Commission, of which William B. Parsons, Robert Ridgway and Bion J. Arnold are the commissioners, and H. M. Brinckerhoff is chief engineer. The expenditure of this sum is called for in the course of nine years, divided into three equal periods. The immediate construction program for the period 1917 to 1920 calls for an expenditure of $60,553,000, the second period $24,516,300, and the third period, principally for additions to rolling stock and extensions of the surface lines, $11,302,000. The ultimate investment to carry out the plans of the commission through the year 1950, with a Chicago of 5,000,000 inhabitants, is placed at a minimum of $260,000,000.

The general physical plan of the traction system is elaborate in its scope, and aims to provide main rapid transit lines that will serve all parts of the city, distribute traffic, relieve congestion and carry people to and from all the business districts of the city, whether central or outlying; to provide rapid transit routes outside of the loop district, enabling through passengers to travel direct without being unnecessarily diverted into or through this district, and to give direct facilities to outlying centers; to provide additional and better means of travel through the central district with a view to broadening its area; to relieve surface congestion wherever necessary and carry as many West Side cars to the lake front as practicable through subways in the loop district, and to provide express service on all parts of the present elevated system.

The conclusions and recommendations of the commissioners provide, briefly, for the unified operation under one management of all of Chicago's local transportation facilities with the control vested in the City Council, but giving to a board of supervision and control the broadest possible powers as to improvement and regulation of service, development of the property, extension of facilities and other administrative matters. The existing companies are to surrender their present franchises and receive in lieu thereof a franchise to the new corporation, terminable at any time by the city by purchase, by amortization, or by forfeiture if the corporation fails to comply with the provisions of the ordinance. The city's present traction fund will be used for the construction of the subways, which it is planned will be owned by the city from the start. The future divisible net receipts are to be shared by the city in such a way as to facilitate acquisition of the properties. A 2-cent charge for transfers between surface and rapid transit lines is tentatively planned to help carry the heavy capital expenditures of the construction period, but this charge is to be gradually eliminated after construction work is completed, if and as the earnings of the corporation permit. The present free transfer privileges between surface lines and between elevated lines are to be retained. The report also will provide a financial plan, not yet completed, whereby the city and the corporation owning and operating the consolidated companies will each receive the current rate of interest upon the traction fund and new capital as furnished by them from time to time to develop the system. The corporation will receive 6 per cent upon the total valuation of the existing properties at the time of consolidation. A suitable sinking fund (amortization) provision is to be made, and thereafter a division of net receipts on the present basis between the city and the corporation; that is, 55 per cent to the city and 45 per cent to the corporation, provided that the corporation shall receive for its share at least 1 per cent of the gross receipts. The initial nine-year construction program will increase the rapid transit facilities of the city two and one-half times the present rush-hour schedule and call for the construction of 11.1 single-track miles of double-track subway, of which 6 miles are for rapid transit and 5.1 miles for surface cars; 64.5 single-track miles of elevated lines; 150 miles of new surface lines, and 111 miles of rehabilitated surface track. The ultimate plan, which calls for the expenditure of $260,000,000, provides for the construction and equipment of 58.1 miles of subway, of which 53 miles are for rapid transit and 5.1 miles for surface cars, and 525 miles of surface lines.

DEVELOPMENT OF THE GENERAL PLAN

The general plan which the commissioners recommend has in view a development along the following broad lines, which as a primary basis will require the construction of four north and south rapid transit lines parallel with the greater dimension of the city. Two of these lines will pass through the present loop district and the other two will be located further west on Halsted Street and Ashland Avenue. The east and west rapid transit lines extending from the outer limits of the city to and through the greatly broadened central business district will intersect the above four lines, with transfer arrangements at points of intersection. This rapid transit system is to be extended, as may be necessitated by the city's growth from time to time, so as to serve the new and growing subcenters and residential districts. Elevated platforms are to be lengthened and, at convenient points throughout the



PRESENT, PROPOSED AND FUTURE RAPID TRANSIT SYSTEM city, transfer is to be provided from the surface lines to the rapid transit lines to give as complete an interchange of traffic as is consistent with the diversion of the long-haul traffic to the rapid transit lines and the short-haul traffic to the surface lines.

NORTH AND SOUTH RAPID TRANSIT LINES

Considering the fully developed plan and describing the rapid transit lines in order of completion they are, for north and south travel, as follows:

1. A line is to be developed by four-tracking completely the Northwestern and South Side Elevated lines from Sixty-third Street on the south to Wilson Avenue on the north. The central portion of this four-track through line is to consist of a two-track subway extending from Eighteenth Street on the South Side Elevated north under State Street to Chicago Avenue, thence west to a junction with the Northwestern Elevated. The other two tracks of the central section of this through four-track line is to be secured by the utilization of the existing Fifth Avenue elevated tracks extended south to Polk Street, and east over Polk Street to the existing South Side Elevated structure. The through routes on these lines will spread the old loop district north and south by virtue of the subway mentioned above and the existing and extended tracks over Fifth Avenue, both subway and elevated giving two-way service on opposite sides of the loop instead of one-way service as at present.

In addition to these through lines, the existing elevated tracks over Wabash Avenue at Congress Street are to be utilized for South Side stub service. A corresponding North Side stub service is to be provided by the extension of the North Water Street tracks of the Northwestern Elevated east and south to a new elevated stub terminal at State and Lake Streets. Both these terminals will afford special rush-hour service north and south from the loop district similar to the West Side service of the Metropolitan Fifth Avenue stub terminal as well as transfer facilities from West Side lines in both directions.

2. A through north and south line to be established by constructing a two-track elevated railroad north from a terminal at Sixty-ninth Street and Ashland Avenue over or parallel to Ashland Avenue to Twentieth Street with connections to the Englewood and Stock Yards branches of the South Side Elevated Railroad. Thence from Twentieth Street north it will connect with the existing Metropolitan right-of-way with additional tracks constructed on it to Robey Street junction, with grade separation at Marshfield junction. From Robey Street junction a two-track elevated is to be constructed north over or parallel to Robey Street to a junction with the existing Ravenswood branch of the Northwestern Elevated in the vicinity of Roscoe Street, thence by additional tracks north over the existing Ravenswood right-of-way. This line will give direct transfer to the five existing elevated branch lines from the west and to five branch and main lines to the east.

3. A two-track subway is to be built extending from a transfer terminal at a point south of Sixty-third Street and at or east of Cottage Grove Avenue, northward under Cottage Grove Avenue or some adjacent north and south street to about Twenty-second Street, thence to Michigan Avenue, to Ninth Street, thence west, passing under the State Street subway to Clark Street, thence north under Clark Street, passing under and connecting with the State Street subway at Chicago Avenue. These two subways form a four-track subway extending north under Clark Street to a junction with the Northwestern Elevated in the Belmont-Wilson (Lake View) section. Two tracks may be needed northwesterly beyond this district to accommodate the outlying territory. At the termini of this subway, suitable and convenient transfer arrangements are to be provided for passengers from radiating surface lines, as well as facilities for through running of trains from rapid transit lines reaching out into the outlying districts.

4. A line over Halsted Street formed by a two-track elevated extension of the Northwestern Elevated south over Halsted Street from North Avenue to the vicinity of Seventy-ninth Street, with grade separations and transfer stations at intersections with the Oak Park Elevated, Metropolitan Elevated and Stock Yards and Englewood branches of the South Side Elevated, is to be constructed.

EAST AND WEST RAPID TRANSIT LINES

For the east and west rapid transit lines the fully developed plan contemplates additional tracks on the existing west side elevated lines to provide express service, extension of these lines into new territory, the construction of a new line into the southwestern portion of the city, amplification of the existing trunks leading into the central business district, the construction of an additional stub connection in the present loop district, and finally the construction of additional trunks leading from west side junction points by subway through the central business district to Michigan Avenue or Grant Park. These are shown on the accompanying map.

The traffic investigations of both surface and elevated lines, as well as the residential and occupational canvass, show clearly the desirability of direct service from the northwestern residential districts of the city into the manufacturing and office building district on the west side of the loop and west of the river north and south of Madison Street. For this purpose a physical connection is proposed from the Metropolitan system to the Oak Park Elevated at Lake and Paulina Streets. Some northwest branch trains can be operated to the Fifth Avenue terminal over their present route, and the others east over Lake Street, either to the Fifth Avenue terminal or through the Union Loop via Lake Street, Wabash Avenue and Van Buren Street. This diversion of part of the heavy traffic now hauled over the four-track Metropolitan trunk east of Marshfield Avenue station to Lake Street will relieve the Metropolitan main trunk, thus providing additional capacity for the west and southwest districts. Later a still more direct service will be secured by constructing the line parallel to Milwaukee Avenue south to a subway connection as above mentioned. Still later, when warranted, the Blue Island Avenue elevated connecting with the subway under Halsted Street will form a symmetrical southwest outlet similar to the Milwaukee Avenue diagonal line.

SURFACE LINE IMPROVEMENTS

Street congestion in the central business district of Chicago has already reached the point where relief has become imperative. With the extremely limited possibilities of providing further street capacity there remains but the alternative of depressing surface lines beneath the streets. Hence surface line subways are recommended by the commissioners on the score of necessity even if they cannot fully justify their investment. As one element of the broad, general plan recommended such surface line subways should be constructed through the congested central business district to form the nucleus of a downtown terminal system of subways into which as many surface line cars as possible should be diverted. As far as the needs of the future may be foreseen these surface line subways should be constructed in the following order:

1. A two-track subway should be built east under Washington Street at low level to Michigan Avenue for the much needed relief of the district north of Madison Street, passing beneath and transferring to the north and south rapid transit subways; thence at high level south under Michigan Avenue to Jackson Street, with loop or stub facilities under Grant Park or Michigan Avenue. This subway with its present west portal under the Northwestern Station can accommodate a number of important lines from the west and northwest territory which now are forced to use the congested surface terminal loops along State and Dearborn Streets.

2. Another east-west two-track subway should be built under Jackson Street from the east portal of the Van Buren Street tunnel (reconstructed for this purpose) east under Jackson Street at low level to a connection at Michigan Avenue with the previously mentioned Washington Street subway.

3. A north-south surface car subway should be built under Indiana Avenue from Fourteenth Street, connecting with the proposed Illinois Central station at Twelfth Street; thence under Michigan Avenue at high level to a connection with the above mentioned west side surface car subways. This subway will accommodate the majority of the surface cars now entering the business district in Wabash Avenue, thus greatly relieving the surface congestion in the narrow throat between the railroad yards west of State Street and east of Indiana Avenue.

In addition to the primary object of relieving surface congestion, a great advantage to be realized from these subways will be the establishment of a much needed station service directly connecting the Northwestern, Pennsylvania-Burlington-St. Paul, Lake Shore, and Illinois Central-Michigan Central steam railroad terminals. This complete subway route further provides for a direct passenger movement between the south lake shore district and the west and northwest districts At present direct transfer facilities downtown between these important districts are unavailable.

Much surface line improvement, however, should, in the opinion of the commissioners, be put into effect at once without waiting for the construction of the above surface car subways. This is urgently required not only because of the rapidly increasing street traffic and the increasing rush-hour passenger traffic on the surface lines, but also the additional street congestion which will unavoidably result from subway and elevated construction work. These improvements require strict enforcement of traffic regulations rerouting as follows:

1. Prohibiting the existing abuse of parking vehicles on car streets and any unnecessary use of tracks by vehicles in rush hours.

2. The reservation of safety loading berths at nearside stops.

3. The use of visible traffic signals at important crossings, maintained and operated by city authorities.

4. The diversion from the heavier car line streets of unnecessary vehicular movement.

5. The abatement so far as practical of interlocking surface loops and divisional operation by further through routing of balanced car movement in the nature of a zone service and the establishment of short lines turning back at the edge of the congested district.

COMMISSION ALSO RECOMMENDS SKIP-STOP

The commission adds that while future surface line operation, routing and schedules cannot possibly be predicted with any reasonable definiteness, it is contemplated that with such a supervisory board as recommended in the report, the city-wide development of the surface lines in conjunction with the rapid transit lines should be carried out efficiently as the growth of the city proceeds. This development should encourage the further establishment of:

1. Logical through routes on sufficiently short headway to render them efficient and attractive to patrons:

2. Further development of the zone system of car operation by means of which service on these long lines may be tapered off according to the traffic demands by establishing short line terminal routes.

3. Skip-stops whenever practicable. The entire outside system of surface line stops should be revised so as to eliminate needless stops, especially on diagonal streets or where transverse streets are offset.

4. Finally, outlying lines intersecting rapid transit lines should be arranged so that transfer of long haul passengers may be facilitated without disturbing or disconnecting the through surface line service along important thoroughfares reasonably required by the traffic

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Wages Should Be Regulated

Committee Report to National Municipal League Favors Giving Power to Commissions as Experiment

THE National Municipal League, an organization founded by representatives of civic bodies throughout the country, received at its twenty-second annual meeting in Springfield, Mass., on Nov. 24, a committee report treating broadly on the subject of public regulation of wages, hours and working conditions of utility employees. In general the committee in question, that on franchises, felt the outstanding fact to be that "continuity" is a fundamental interest of all three parties concerned: for the employees, continuity of employment; for the companies, continuity of earnings, and for the public, continuity of service.

The committee believed that the public interest is sufficient to warrant the adoption of legal measures to prevent strikes, but that until effective substitute measures for the adjustment of the grievances of employees have been worked out and tested, it would be unfair and impracticable to deprive the employees absolutely of the right to use this weapon of self-defense.

Public control over the relations between utilities and their employees, the committee said, might be established by: (1) the inclusion of the necessary provisions in franchises; (2) a general regulation from time to time by statutes or ordinances, and (3) the fixing of standards by regulating commissions or tribunals. The franchise method would be open to the objections that many perpetual, long-term or indeterminate franchises already exist, that a long-term contract is an unsuitable means for regulating changing wages and that employees are not a party to franchise agreements. Where franchises come up for renewal, however, definite provision should be made for the settlement of disputes. Maximum working hours and other working conditions might be fixed, but specific wages should not be established unless made subject to frequent revision.

As for general regulation, the committee stated that wherever well-equipped commissions exist, the duty of establishing detailed standards and rules relative to the relations of utilities and their employees might properly be imposed upon such bodies. As to the settlement of particular disputes and the fixing of wages, etc., in particular cases, the committee favored that experimentally the power be given to the commissions rather than to special tribunals, the decisions to be final for comparatively short periods.

Boston Subway Policy Defended

City Ownership and Private Operation of Tunnels Shown to Be Wise After Twenty Years' Experience and Investment of Thirty-five Millions

CORPORATION Counsel John A. Sullivan of Boston made a vigorous and telling defense of the subway policy of the municipality for the last twenty years at a hearing Dec. 4 in connection with the Boston Elevated Railway revenue investigation. Declaring his belief in city ownership and private operation under present conditions, Mr. Sullivan showed that although Boston has lent its credit to the extent of about $35,000,000 for subway construction, the policy has been sound from the beginning, and that the losses therefrom claimed by the Boston Real Estate Exchange at a former hearing are without foundation.

Mr. Sullivan said that the city's financial relation to the tunnels and subways had been so misrepresented as to make it appear that the municipality had been blundering along in reckless fashion through the entire history of Boston rapid transit legislation. The criticism is that the tunnel leases are unfavorable to the city; that the city is sustaining losses annually on this account; that public ownership is a bad policy financially, and that the city would have been better off had the Boston Elevated Railway built and owned the subways and tunnels and paid taxes on this property to the city. In reality the leases and rentals, taken as a whole, are very favorable to the city, which sustains no loss on their account and will ultimately gain greatly by them. The policy of public ownership has had the sanction of the Legislature, of the city government, and of the people as expressed by popular vote. Mr. Sullivan said, however, that he believed the public would choose to-day an unfavorable contract involving city ownership and stand the financial loss in preference to a more favorable contract between the road and the city by which the company would own the subways.

PUBLIC OPERATION NOT FAVORED

The only doubt that has ever been expressed, the speaker said, is as to whether public operation should have been added to public ownership. "Personally I should oppose public operation," said Mr. Sullivan, "but that of itself is a question simply of expenditure. If the day ever arrives when these communities are so well organized that they can administer these transportation systems efficiently and economically, then it will be proper at that time for the public to operate the transportation systems as well as to own them. In my judgment that day has not arrived, and the best solution of this kind of problem is to have the public own the subways and tunnels and lease them to private corporations for operation. Knowing the history of the public ownership of these tunnels and subways, therefore, I was astonished when I read the Boston Real Estate Exchange's wail over the taxes it said the city is losing—losing because the city owns the property and therefore cannot tax the road on it. In other words, the city cannot tax non-taxable property. This loss was put at $200,000 a year, and it made it look as if the city needed a conservator. Of course, there is no loss of taxes on the tunnels and subways, any more than there is on the City Hall or the City Hospital." The case was made to appear worse by combining two losses which could not possibly co-exist, *viz.*, the so-called losses of public and of private ownership throughout the same period.

More serious than this illogical combination of losses, Mr. Sullivan said, is the misstatement as to the annual deficit in the interest and sinking-fund requirements of the city's rapid transit loans. There was no deficit in the interest requirements in 1915, or in any prior year, and there never will be. The combined rentals will always take care of the combined interest charges, because the average rate of interest paid by the city on the bonds is 3.84 per cent, and the rentals paid to the city are, to speak broadly, 4.5 to 4.875 per cent. The actual results of twenty years' ownership of subways in Boston are: (1) No deficit in interest requirements; (2) total deficit in the entire period of only $58,869 in sinking-fund requirements, and (3) an equity in favor of the city in the tunnels and subways of $3,778,986, represented by the amount in the sinking funds up to Jan. 31, 1916. All this has been secured without calling for a single dollar from the taxpayers in the entire period.

In the present year, 1916, the taxpayers made their first contribution toward the cost of the subways. The car riders have in general paid the whole cost of construction and of operation of this road. The city appropriated $77,910 from taxes to take the place of the penny tolls of the East Boston tunnel, which were abolished in February, after due popular vote and legislative enactment. The total appropriations required for this purpose will probably not exceed $400,000, which is less than one-half the value of the city's present equity in the tunnel.

There will be some debt when the existing subway and tunnel bonds mature, but that will be refunded and eventually retired, so that the city will own the entire system of subways and tunnels free from debt, without having required any contribution from the taxpayers other than the above-mentioned $400,000 raised to take the place of the East Boston tunnel tolls. Beginning with 1946, there will be large additions, amounting to about $686,000 a year, paid in from the rentals of subways, which at that time will be debt free. In the future it is desirable that each subway built shall finance itself, but the rate at which this can be done depends upon the state of the money market. The highest rate the city has been obliged to pay on subway bonds is 4.25 per cent.

METROPOLITAN OWNERSHIP AND CONTROL OPPOSED

Mr. Sullivan emphasized the fact that the city is opposed to any plan for the ownership and control of tunnels and subways by a metropolitan organization or commission. Boston has taken the risk of financing the subways; it now has a substantial equity in them, and it will not surrender them to a metropolitan district now that its experiment seems likely to succeed. The city will fight such a plan to the last ditch. Nor will it consent to control by a metropolitan commission. It owns its subways and it wants only Boston citizens on any commission which plans future rapid transit development within the Boston territory. The city has reason to believe that a metropolitan commission would very early in its career plan rapid transit development in such a way as to subordinate Boston interests to outside interests and to put its highways under a new servitude in favor of the municipalities outside. Such plans would probably find favor in the Legislature, owing to its political complexion, and such great undeveloped areas as West Roxbury and Dorchester would have to wait until outside interests had first been served.

In these undeveloped districts there are but eight persons per acre, compared with 40.4 persons in the rest of Boston. Four new wards have 41 per cent of the land in the city and only 12.5 per cent of the population. Until better transportation is provided, the development of the city will be retarded. In reply to inquiries, Mr. Sullivan said that Mayor Curley of Boston is not opposed to an outside commission's taking over tunnels and subways outside Boston proper, as in Cambridge. The state could presumably take the Boston subways by eminent domain if it so desired, but the city would oppose it because the whole cost paid by the state for recoupment would very likely not be worked out through rentals.

If the communities are to make a substantial reduction in taxes, they might well claim some supervision over the company's expenditures. Moreover, if there should be a formal guarantee on the part of the public of, say, a 6 per cent dividend for the company, there should be some participation by the public in the control. On another point Mr. Sullivan stated that in view of the possible benefits to real estate and population increase resulting from the building of a rapid transit line, it would be proper in some instances to provide deliberately for the renewal of part of a subway bond issue at maturity, instead of establishing a rental which would invariably pay the sinking-fund requirements during the life of the bonds. A situation might even arise which would justify the city in building a certain subway line at its own expense and foregoing the advantage of rentals. A graduated rental and a policy of deferring the beginning of sinking fund payments might also be justified in some cases. In such event the rental would naturally be increased during the latter portion of the lease and the city should be guaranteed against immediate loss by having the rents equal to the interest requirements from the beginning.

Who Should Pay the Transportation Cost

In response to a question, Mr. Sullivan said that theoretically the car riders ought to pay the entire cost of transportation, but as a practical matter, if resort must be had to reduction of taxes or to increased fares, it would work out better in the long run to have a reduction in taxes, at least temporarily. There is some equity in having taxpayers who may not use the company's service to any extent contribute toward a subway fund which will ultimately become an asset of the city. There are owners of automobiles whose property values have been enhanced by the street car lines, and to that extent they may well be called upon to assist. A special assessment against individuals, however, in place of a general tax levy, would be undesirable and difficult to enforce.

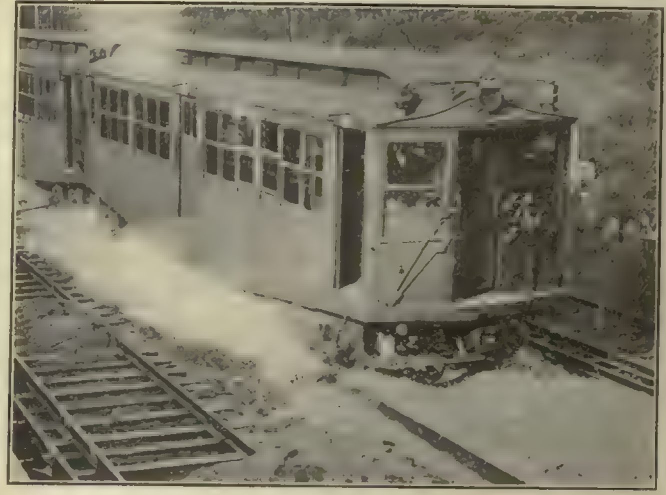
President Brush Discusses Higher Fare Problem

Following Mr. Sullivan, President Matthew C. Brush of the Boston Elevated Railway answered a number of inquiries bearing upon the problem of higher fares. Mr. Brush said that if the company could secure the needed revenue in other ways it would be unfortunate to resort to a 6-cent fare, and that it would be better to go so far as to subsidize a transportation company to secure a continuance of a fare arrangement on which the community has been built up. In Boston the facilities offered for a 5-cent fare exceed those anywhere else in the world, if the interrelation of rapid transit and surface line service is taken into account. As far as loss of business resulting from a 6-cent fare is concerned, Mr. Brush felt that unquestionably there would be a net profit, although a 20 per cent gain could not be expected. Some of the short-haul riders would be lost, and there would not be enough falling off in traffic to offset the benefit of higher fares from those who continued to ride.

New Derailing Train Stop Tested at Boston

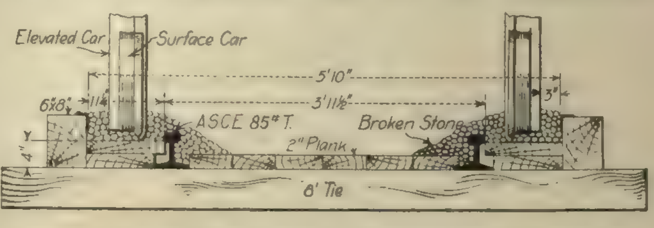
Train to Be Stopped Is Deflected Onto a Broken Stone Roadbed, Being Guided by Means of Wood and Steel Guard Rails

In the presence of the engineering committee on drawbridge operation recently named by Mayor Curley of Boston, Mass., representatives of the city and of the Massachusetts Public Service Commission, railway officials and newspaper men, a new derailing train stop was tested at the Forest Hills yards of the Boston Elevated Railway on Nov. 29. The development of safety precautions in connection with drawbridge operation for both train and surface car service has been given constant attention by the Boston Elevated Railway since the fatal accident at Fort Point Channel on Nov. 7, and the test at Forest Hills indicates that a remarkably effective and simple means of stopping elevated trains is available for drawbridge approaches, even in cases where the motorman fails to shut off power and where the brakes fail to operate, if it is possible to install a derailing track on the right of way.



BOSTON SAFETY STOP TESTS—ELEVATED TRAIN PLOWING THROUGH BROKEN STONE BED

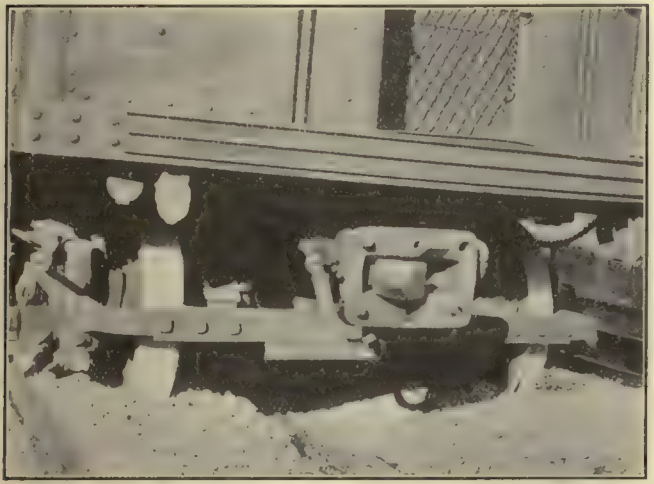
In all the conferences at Boston upon safety in operation at drawbridges following the recent disaster, emphasis has been laid by electric railway men upon the importance of instituting a gradual stop in bringing a train or car quickly to rest, and this principle has been recognized by the Massachusetts Public Service Commission in its finding upon the Fort Point Channel accident. President Matthew C. Brush of the Boston Elevated Railway has taken active personal interest in the development of methods for increasing the safety of operation, and under the general direction of H. M. Steward, chief engineer maintenance of way, with the co-operation of other officials of the company, the new train stop or "decelerator" has been established.



BOSTON SAFETY STOP TESTS—CROSS-SECTION OF SPECIAL EMERGENCY-STOP SIDE TRACK

As installed for test purposes at Forest Hills, the train stop consists of a stretch of roadbed about 300 ft. long, without running or third rails, but provided with the usual 6-in. x 8-in. wooden guard rails. Between the latter crushed stone 1 in. in diameter is piled against each guard timber, and as a precaution against injury to the guard timbers a section of T-rail is installed as an inside guard and covered to a depth of about 3 in. with stone. The inside rail is about 8 in. from the guard rail, and the section of retarding track is provided at the connection with the ordinary running track with a thin wedge of wood, steel plated, to guide the wheels more accurately as the train leaves the running track.

Upon approaching the decelerating track with full power on the motors the supply of energy is automatically cut off as the third rail shoes break their contact and the train enters the crushed stone right of way at full momentum. The wheels are embedded in the crushed stone, forcing the latter down into the roadbed and against the guard timbers. The dead cars rapidly lose their momentum as the wheels roll forward, and a smooth stop with a retardation of about 2 m.p.h. per second results. A four-car train upon which a representative of the ELECTRIC RAILWAY JOURNAL rode, after a rainy night came to a dead stop in ten seconds from a speed of about 22 m.p.h., the foremost wheels in the train coming to rest at a point 203 ft. from the entrance to the derailing track. Beyond an insignificant jar as the train left the running rails, the retardation was virtually as smooth as in an ordinary service application of the brakes, and much smoother than an emergency stop would ordinarily be. At 25 m.p.h. a four-car train stopped in 232 ft. In some tests sand was used instead of trap rock and single cars of the box and semi-convertible type were tried. Crushed stone gave the best results. Representative data from the tests are given in the following table:



BOSTON SAFETY STOP TESTS—CLOSE VIEW OF FRONT OF FOREMOST TRUCK AFTER TRAIN HAS COME TO REST

CAR AND TRAIN STOPPING TESTS, FOREST HILLS YARD, BOSTON ELEVATED RAILWAY

Nov. 27 AND 28, 1916

Number of Tests	Type of Car or Train	Speed in M.p.h. Entering Stop Section	Feet Traversed in Retardation	Remarks
1	20-ft. box	11.0	43	Sand used in stop section
1	20-ft. box	14.5	54	Sand used in stop section
1	4A3 semi.	14.5	62	Sand used in stop section
2	4A3 semi.	18.8	97	Sand used in stop section
2	4A3 semi.	18.3	96	Pebbles used in stop section
3	4A3 semi.	20.3	90	1-in. crushed stone used in stop section
1	2 elevated cars	23.5	177	1-in. crushed stone used in stop section
1	3 elevated cars	23.0	200	1-in. crushed stone used in stop section
1	4 elevated cars	22.0	215	1-in. crushed stone used in stop section
1	4 elevated cars	25.0	232	1-in. crushed stone used in stop section

Minor variations were noted according to the condition of the roadbed, extent of crushing, dryness, etc.

In general, a four-car elevated train entering the stop section at from 20 to 25 m.p.h. was brought to rest substantially within its own length.

It is planned to install a train stop built along the above general lines between the north and southbound tracks on the north approach to the Charlestown drawbridge, on the rapid transit lines, and also to provide a stop of this general character on the East Cambridge viaduct for surface cars. Whenever the draw is open a switch will automatically be set to turn a train passing a danger signal and automatic stop upon the intermediate roadbed, which will probably be equipped with one or more light bumpers in advance of the derailing section, the latter to be covered with moisture-proof paper or its equivalent.

Mechanical Design of Electric Locomotives*

The Author Discusses A. F. Batchelder's Recent Paper, Submitting Actual Operating Records, Which He Considers Most Important

BY C. H. QUEREAU
Superintendent Electric Equipment, New York Central Railroad

IN the main I agree with the conclusions that have been presented to the American Society of Mechanical Engineers in A. F. Batchelder's paper on the mechanical design of electric locomotives. However, it seems to me very unfortunate that this paper, as well as others recently presented, is simply a general statement of the conclusions of the writer rather than a statement of accomplished results. I am reminded very forcibly of the discussion indulged in about ten years ago before any considerable electrification of steam railroads had been accomplished. These discussions were based almost entirely on personal views and theories, without any demonstration. At the time of which I speak this was necessarily so, but there should now be available accurate figures based on actual operation. This criticism, in general, is true of all electrification papers, probably because of mistaken ideas on the part of those who have the facts or those who have the authority to make them public. That Mr. Batchelder appreciates this is shown by the last paragraph of his paper.

In Mr. Batchelder's paper the list of desirable features arranged in the order of their importance did not include "Maintenance." It is quite probable that convenience of maintenance was in the author's mind, but it seems to me of sufficient importance to be mentioned specifically.

The analysis of the action of a locomotive on curved track I must confess that I cannot quite follow, probably because I do not clearly understand what was written or have not the information on which the author bases his discussion. For instance, in describing the action of a two-axle swivel truck the statement is made that "the flange of the leading wheel gradually comes in contact with the outer rail, giving the guiding truck an angular motion about its outer rear wheel." I have believed that the angular motion of a four-wheeled truck was about its inner rear wheel, the fact being that when a truck is on a curve the outer forward wheel flange and the inner rear wheel flange are against the rail, the other two flanges not touching the rail. I do not see, however, that this difference is of particular moment, and bring it up only that the matter may be discussed and clearly understood.

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*Discussion of a paper on this subject by A. F. Batchelder, presented before the American Society of Mechanical Engineers, Dec. 15, 1916, and published in abstract in the ELECTRIC RAILWAY JOURNAL for Nov. 4, 1916.

With regard to the operating advantages gained by having electric locomotives designed to operate in either direction, I consider this feature to be of so great importance that satisfactory designs must be found to meet this condition. This need exists notwithstanding the fact that the effect of a trailing truck contributes to unstable riding of the engine. Mr. Batchelder proposes to prevent the consequent oscillation by the introduction of resistance against swivelling. This scheme is practicable and has been so demonstrated, but it results in increased flange wear, at least when the locomotive's center of gravity is low.

I am particularly interested in the feature of reliability in service for electric locomotives. It is a requirement that is quite commonly omitted in a discussion of this kind. On railroads that run through a sparsely settled country, with comparatively few trains per day, a train delay of half an hour may be of comparatively little importance. But in Eastern territories, especially around the large cities, a delay of a very few minutes will upset the smooth operation of the railroad for hours, and the effect of it may reach back on the line for 150 miles. It is, of course, impossible to determine in dollars and cents the cost of a delay in congested territory, but that it may easily amount to large sums in over-time there can be no doubt, and its effect on the traveling public can better be imagined than described. It is my opinion that the prevention of such delays is worth considerable increase in the first cost of electric locomotives, and that the maintenance methods should be such as to prevent, so far as possible, delays to traffic, practically regardless of cost. It is decidedly poor policy to reduce maintenance costs if by so doing the result is an increase in traffic delays.

Mr. Batchelder very wisely considers the cost of maintenance of permanent way to be of more importance than cost of maintenance of locomotives. Yet it is extremely difficult to state definitely what, if any, effect the electric equipment has on the cost of maintenance of track. I believe, as a general proposition, it would be safe to assume that, if the cost of maintenance of way is no greater under electric than steam operation, it would be a satisfactory condition, which undoubtedly would not be used as an argument against electrification.

As to the cost of maintenance of electric locomotives, the difference in maintenance charges at the rate of 3.5 cents per mile and the frequently reported figure of 7 cents per mile may be figured as not less than $1000 per engine per year. This saving, when capitalized, represents a considerable sum, and its establishment would warrant an appreciable increase in first cost. The sum mentioned is 10 per cent of $10,000, or 5 per cent of $20,000.

So far as I know, there have been published very limited data as to service results, either as to first cost or maintenance, or reliability in service as shown by train-delay statistics. Under these circumstances it would be only reasonable to expect differences of opinion and, in all probability, failure to consider results as a whole. In consequence I am submitting herewith maintenance and operating records for the electric engines on the New York Central Railroad.

These locomotives are all equipped with bi-polar, gearless motors mounted directly on the driving axles. The operating results have been completely satisfactory to the officials of every operating department affected, although this statement does not include consideration of the net financial returns from the investment, which must take into account the item of fixed charges.

With the usual maintenance these locomotives ride satisfactorily and without undue effect on the track structure, and are perceptibly more comfortable than steam locomotives. In order to secure these results it is necessary to keep the total lateral motion, both at the boxes and at the center-pins, within limits which approximate three-quarters of the allowable lateral motion on steam locomotives.

Table I contains statistics which will permit a personal conclusion as to the reliability of these locomotives in service, and this will probably be more satisfactory than any general statement or expression of opinion, no matter how authoritative. In connection with this table I wish to enter a strong plea for the use of the unit "Miles Per Detention" rather than "Miles Per Minute Detention" for the preparation of statistics by which to judge the reliability of equipment in service and the efficiency of the organization responsible for maintaining it. Inclusion of the time element leads only to confusion, and is, therefore, worse than useless.

TABLE I—TRAIN DETENTIONS DUE TO DEFECTS OF ELECTRIC LOCOMOTIVES, NEW YORK CENTRAL RAILROAD

Miles Per Detention—All Locomotives

Year	Mechanical	Electrical	Grand Total
1912	48,271	103,967	32,965
1913	27,873	86,716	21,093
1914	35,625	57,395	21,981
1915	53,720	107,440	35,813
Original Rigid-Frame-Type Locomotives			
1915	59,583	187,260	45,201

Note: All detentions of two minutes or more included. In 1912 there were forty-seven locomotives in service. Since the middle of 1914 there have been sixty-three. Detentions due to man failure, or delays to following trains, not included.

TABLE II—INSPECTION AND REPAIRS OF ELECTRIC LOCOMOTIVES

Cost, Cents Per Mile

Year	Labor	Material	Total
1912	1.888	1.460	3.348
1913	1.982	1.454	3.436
1914	2.155	2.134	4.286
1915	1.901	1.379	3.280

Note: The above statistics were compiled in accordance with the requirements of the Interstate Commerce Commission. In the year 1914 it was necessary to replace all driving-wheel tires because of unsuitable material, regardless of the extent to which they had been worn. The costs of maintenance have been essentially as above since 1907, omitting 1914.

In connection with Table II the following facts should be borne in mind: The figures include the cost of inspection and maintenance of all the electric locomotives in both road and switching service. In 1912 and 1913 approximately half the total engine mileage, and in 1914 and 1915 approximately one-third of the mileage was that of engines used in switching service. Our experience has shown that the cost of maintenance of engines in switching service is about twice that of those used exclusively in road service. It follows that the cost of maintaining the road locomotives has been about 2.5 cents per mile and that of the switch engines about 4.9 cents per mile. In this connection it is only fair to call attention to the fact that these engines were not designed for switching service.

For the first ten months of 1916 the average cost of maintenance of all the electric locomotives has been 2.73 cents per mile. This gives a cost of approximately 4 cents per mile for the locomotives in switching service and approximately 2 cents per mile for those in road service. I expect these costs will not be exceeded for the entire year 1916, but doubt very much that we will be able permanently to keep the maintenance costs at this level.

A gun club, with twenty members to start, has been organized among the employees of the Kansas City (Mo.) Railways. The officers will instruct members in the handling of a gun. The company will assist in securing and building a club house, so that the expense to members shall be nominal.

Securing Industrial Democracy*

Capital and Labor Should Be Equal Partners—Profit Sharing Plan Suggested—Strikes and Lockouts Should Be Prevented by Law

BY GEORGE WESTON
Engineer Board of Supervising Engineers, Chicago Traction

THIS paper is presented for the purpose of bringing out a most liberal discussion of the subject, particularly of the fundamentals and recommendations contained therein, with the hope that it will have its influence in bringing the representatives of labor and capital into a more satisfactory and harmonious working relation for their own mutual benefit and permit the uninterrupted operation of public utilities for the accommodation of the public.

A copy of the paper has been received by the President of the United States and additional copies have been sent to his secretary for distribution. Others to whom copies have been forwarded are the presidents of the brotherhoods of steam railroad employees and other labor leaders; Chairman Newlands and Vice-Chairman Adamson of the joint committee on Interstate Commerce, United States Senate and House of Representatives; members of the Interstate Commerce Commission, railroad presidents, several state public utility commissions, officers of the Chamber of Commerce of the United States, the Chicago Association of Commerce, and many other interested organizations and individuals.

The necessity for a public utility is the need of some class of service to the public, and this requires capital investment and the work of labor skilled in the different branches necessary to create the property and operate it. Each should receive a fair return for its service, but neither capital nor labor should be permitted to exploit the property for unreasonable gain or for the exercise of objectionable, coercive union or political power. Capital should not be permitted to pile up huge profits at the expense of underpaid labor. Capital and labor should be partners in the business, each receiving its fair return from the net profits. When labor understands that it will be placed upon a footing equal to that of capital, that there will be one great democracy of interests building up a great public utility to serve the people, then the present general feeling of jealousy, dissatisfaction and unrest will disappear and harmony and general good feeling will be restored.

My connection with public utility matters for many years has caused me to give this subject considerable study. At the time of the street and elevated railway strike in Chicago in June, 1915, I compiled the following fundamentals:

(1) Capital and labor are dependent upon each other.
(2) Capital cannot be successfully employed without the help of labor, and labor cannot be profitably employed without the assistance of capital.
(3) From this fact it seems most fair and equitable that each should participate fairly in the results of their joint efforts.
(4) This principle should be the fundamental economic basis upon which to consider the relations between capital and labor.
(5) Therefore, the two chief elements necessary to create and operate a public utility have the same fundamental interest in properly performing the obligation to the public assumed in the franchise of the public utility.
(6) This obligation should be inviolate in principle, and good service to the public should be the first consideration in the operation of a public utility property.
(7) The obligation to give good service to the public falls upon labor as much as upon capital. Consequently, all legitimate and fair operating expenses necessary to give good service must be considered, as well as all reserve funds necessary for the upkeep of the property or other franchise obligations, before any increased division should be made to capital or labor.
(8) After having fulfilled all franchise obligations, any remaining earnings should be disposed of upon some fair basis to the benefit of both labor and capital.
(9) It would be unfair to increase the share to capital beyond a reasonable return upon the investment and not increase the return to labor, and it would be unfair to increase the return to labor by reducing the return to capital below a reasonably fair amount.
(10) From the fact that service to the public should be the first consideration of any public utility, it should be unlawful for the employees to conspire to strike or the employers to conspire to institute a lockout.
(11) It would seem that a national, state or city court or board of arbitration should be established by law, to which body should be referred all matters of dispute between employer and employees that cannot be settled between themselves, and this should be accompanied by a law making it a penal offense for employees to conspire to strike or for employers to conspire to institute a lockout.

It often becomes necessary for persons to be protected against themselves, and I am herewith recommending forced arbitration and legislation to prevent strikes or lockouts, not in order to attack either labor or capital but to prevent them from conducting a warfare based upon erroneous principles. The strong arm of the government should be used, not in favor of one side but impartially in favor of the general public for its general good. Is it fair to the general public to exact legislation to control rate making in the case of capital and then tolerate unlimited organization of labor and its use of threats and coercion to accomplish its selfish ends in regard to one element of rate making, *i.e.*, wages?

Profit sharing, as it has been practised in the past, differs from industrial democracy as advanced in this paper. The initiation of profit sharing and its discontinuance have been optional with the employer. Industrial democracy, however, as applied to public utilities means that along lines fair and equitable to all parties, capital, labor and the general public, the continuity of service to the public shall be regulated by law, nationally to the extent applicable, and by state and city legislation to the extent necessary, and that the character of service and rates and the distribution of gross earnings shall either be regulated by law or supervised by a board or boards of control established by law.

With large public utilities the following basis of profit sharing offers a simple method of adjusting income distribution so that capital and labor will each receive its just share. It must be conceded that the wages of labor at the present time in the United States are high by comparison with any previous time in its history or with any other nation. Present wages, therefore, can be taken as the minimum return to labor and be used as a fair basis for future payrolls to be charged to operating account, or be readjusted from time to time as the limitations of the gross income may require. The total amount thus paid will establish the percentage of the gross receipts paid to labor. This gross amount allowed to labor for future payrolls should be distributed between all classes of labor upon the basis of value of service rendered, the skill required, the hazard with respect to life or limb, etc.

It is necessary to determine what is a fair percentage of return for capital, including sufficient to care for extra hazards of the business and corporate organization expense, etc. This, together with general operating expense, including taxes, renewals, any other necessary reserve funds, franchise obligations and the possible establishment of a cash working reserve, should be first deducted from gross income. The residue, if any, should then be divided between labor and capital in the proportion that the total per cent of gross paid in wages to labor bears to the per cent of fair return to capital.

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*Abstract of paper presented before meeting of Western Society of Engineers, Chicago, Ill., on Dec. 4.

Many other dispositions of surplus earnings in the interest of both capital and labor could be arranged and worked out in detail to cover the general principle or to fit any particular case. The above is simply an example.

In the discussion on the paper abstracted above, Ira W. Dye, Newark, N. J., declared there is no identity of interests between capital and labor to-day, and there cannot be until a few labor men have been elected upon the boards of directors and a few directors placed in the position of workingmen. He favored profit sharing with employees through stock ownership. C. W. Baldridge, Chicago, Ill., said that it is time to extend the functions of courts to deal with disputes between capital and labor and protect the paramount rights of the public. A. J. Schafmayer, Chicago, Ill., declared that the obligations that can be placed upon capital and labor are not equal because capital has, through franchise rights, received a monopoly. On this account, he argued, a strike should not be made a penal offense. He also expressed the opinion that there should be a third party in the division of profits, *i. e.* the public, which should get its profit through reduced rates.

MID-YEAR MEETING
BOSTON
FEBRUARY 16, 1917

ASSOCIATION NEWS

MID-YEAR MEETING
BOSTON
FEBRUARY 16, 1917

Engineering Association Committee Appointments Announced—B. R. T. Indorses Educational Committee Work—Equipment Committee Plans Definite Co-operation with Manufacturers—Several Sections Heard From

Educational Committee Notes

On Dec. 1 the electrical department of the Brooklyn Rapid Transit Company, by H. A. Robbins, superintendent of power, issued a notice which in part is as follows:

NOTICE TO ALL EMPLOYEES

About two years ago the American Electric Railway Association, of which this company is a member, tried the experiment of conducting correspondence courses for the employees of member companies. The same was not a success due to lack of organization. Therefore, the plan was abandoned and arrangements were made with the International Correspondence Schools of Scranton to take up the work. The American Association has approved and co-operated with the schools in preparing courses which will be offered. This arrangement makes it possible for those of our employees who desire to secure technical knowledge pertaining to their work in its many phases, such as steam, electric and mechanical engineering.

We are satisfied that material benefits will result to all who can and will give the necessary study time to any of the courses, and we would suggest careful investigation of the courses offered. However, all should appreciate that a lot of good hard study will be required to complete any of the courses.

Manufacturers' Association

Thomas Finigan, president of the Manufacturers' Association, has sent to the members copies of a letter summarizing the findings of the committee appointed to consider the advisability of continuing the association, and, further, to formulate plans, if possible, looking to the use of the association to promote the interests of the electric railway industry. As was fully explained in the issue of the ELECTRIC RAILWAY JOURNAL for Oct. 14, 1916, page 849, the recommendation was that the association be continued for another year at least for the following reasons: "1. That this is the first time that manufacturers and sellers of electric railway supplies have not participated as an organization in the activities of the electric railway convention, due to the action of the American Association at the meeting in Chicago, February, 1916, when the constitution and by-laws were altered so as to admit manufacturers to full company membership with all the rights and standing of railway companies. 2. Although manufacturing concerns are now members of the railway association their exact status has not yet been determined."

The committee report was signed by B. A. Hegeman, Jr., chairman; James H. McGraw and M. B. Lambert.

Equipment Committee to Have Flying Start

Although the Engineering Association committee on equipment has been appointed but a few days, a meeting is already scheduled for Dec. 13 in New York. The assignments listed in the ELECTRIC RAILWAY JOURNAL Nov. 18, page 1063, will be divided among sub-committees with instructions to consider particularly the revision of standards and recommendations now contained in the *Engineering Manual.* The following manufacturers' representatives have been invited to act in conjunction with the committee: C. F. W. Rys, Carnegie Steel Company; A. A. Green, Galena Signal Oil Company; C. E. Eveleth, General Electric Company; N. W. Storer, Westinghouse Electric & Manufacturing Company; W. S. Adams, J. G. Brill Company, and G. W. Lyndon, Association of Manufacturers of Chilled Car Wheels.

Committee Appointments

ENGINEERING ASSOCIATION

President F. R. Phillips has announced the following committee appointments. Other committees will be announced as soon as all of the members have accepted appointment.

Buildings and Structures—C. S. Kimball, Washington, D. C., chairman; H. G. Throop, Syracuse, N. Y.; F. F. Low, Boston, Mass.; H. E. Funk, Brooklyn, N. Y; James Link, Knoxville, Tenn.; R. C. Bird, New York City; G. C. Estill, Portland, Me.; H. R. Whitney, Springfield, Mass., and H. C. Young, Buffalo, N. Y.

Electrolysis.—A. S. Richey, Worcester, Mass., chairman; I. W. Gross, New York City.; E. B. Katté, New York City; E. J. Blair, Chicago, Ill., and G. W. Palmer, Jr., Boston, Mass.

Way Matters—C. H. Clark, Cleveland, Ohio, chairman; A. E. Harvey, Kansas City, Mo., vice-chairman; E. M. Haas, Cleveland, Ohio; E. M. T. Ryder, New York City; W. F. Graves, Montreal, Quebec; William R. Dunham, Jr., New Haven, Conn.; C. G. Keen, Philadelphia, Pa.; H. H. Ross, Toledo, Ohio, and D. P. Falconer, Rochester, N. Y.

Special Committee on A. I. E. E. Rules—J. W. Welsh, Pittsburgh, Pa., chairman; C. L. Cadle, Rochester, N. Y.; W. A. Del Mar, New York City; J. M. Waldron, New York City, and J. J. Sinclair, Brooklyn, N. Y.

JOINT COMMITTEE

Presidents Bradley and Phillips have also announced the following appointments:

Transportation-Engineering—G. H. Clifford, Fort Worth, Texas, chairman.

Engineering Association Members—J. W. Allen, Boston, Mass.; R. F. Carbutt, New York City, and E. F. Gould, Lima, Ohio.

Transportation & Traffic Association Members—F. W. Hild, Denver, Colo., and F. W. Coen, Sandusky, Ohio.

ACCOUNTANTS' ASSOCIATION

President M. R. Boylan announces the following as the committee to represent the association at the convention of the National Association of Railroad Commissioners: W. F. Ham, Washington, D. C., chairman; N. E. Stubbs, Baltimore, Md., and C. L. S. Tingley, Philadelphia, Pa.

The Traffic Inspector Discussed at Manila

Joint company section No. 5 held its twenty-first monthly meeting in Manila, P. I., on Oct. 10. A paper by Jerome Grindstaff, division superintendent, on "Duties of a Traffic Inspector," was presented by the author and discussed. As a paper of this kind is necessarily a summary of the details of the work of the official in question, Mr. Grindstaff's statements may be summarized for reference in the following epigrammatic form although these points were considerably expanded in the paper.

An inspector must bear in mind that he is engaged in a public service where he is constantly called upon to exercise great patience and self-control.

In going on duty he should inspect all cars leaving the carhouse and should make a trip over his entire division as soon as possible for the purpose of inspecting track, overhead wiring, signal lights and telephones.

He should be familiar with all schedules, transfer points, transfer connections, etc.

He should persistently endeavor to interest his trainmen in their work.

He should not humiliate trainmen by reprimanding them in the presence of passengers.

He should work in harmony with other inspectors and be as courteous to employees as to passengers.

He should keep his cars on time but should not allow the making up of time in dangerous locations.

He should prevent delays at layovers, adjust car capacity to demands and see that the cars are comfortable and sanitary.

He should see that the traveling public is handled safely.

He should issue instructions intelligibly and see that they are understood.

He should see that correct car signs are used and that the public is correctly informed regarding routing, etc.

He should exercise good judgment in the case of emergency, keeping up traffic by temporary rerouting if necessary.

He should explain operating details to passengers when questioned.

He should keep his superintendent informed of all special demands on the transportation facilities.

He should be well informed on all regular and special rules, making timely suggestions as to revisions.

He should confine himself to his own division as far as giving of orders is concerned.

He should exercise great care and good judgment in checking the work of conductors.

He should report accident cases fully and promptly, assisting the car crews in securing lists of witnesses' names.

In the discussion of Mr. Grindstaff's paper, O. Keesee, superintendent of transportation; J. M. Bury, assistant superintendent; Leopoldo Jiz and J. J. Dunning, traffic inspectors, and C. H. Van Hoven, claim agent, reinforced the speaker's remarks from their own experience, commending the intelligent use of the telephone service, the study of the general needs of the service, loyalty to the company's interest, and the exercise of tact. J. H. Blaisdell, just returned to Manila after a vacation in the United States, gave some reminiscences of his trip.

Snow Fighting and Preparedness

The above was the topic discussed at the meeting of the Denver Tramway Company Section held on Nov. 24, this being the thirty-ninth regular monthly gathering of the section. The attendance at this meeting was 200.

The topic of the evening was set before the members in papers by W. L. Whitlock and T. Sparks, who described the methods and equipment necessary in coping with the several types of snowstorms. The papers provoked a lively and lengthy discussion in which many members participated, and the chairman reluctantly adjoined the meeting at a late hour.

A Busy Session of Section No. 1

Eighty members attended the meeting of the Milwaukee Electric Railway & Light Company section held on Nov. 9. The election of officers resulted as follows: President, A. E. Wallace, division superintendent; vice-president, E. H. Olsen, promoted from secretaryship; secretary, F. A. Luber, draftsman; treasurer, T. J. Buckley, surveyor; director, E. J Archambault, civil engineer.

Three members described their experiences and observations at the Atlantic City Convention, covering respectively track work, rolling stock and transportation. F. A. Luber was announced to discuss current events of the way and structures engineering department which he did with the aid of lantern slides, some of which were of a humorous character. He described the layout of the new offices of the department and showed how it was related to the efficient carrying on of the work. Following this, motion pictures and lantern slides were shown to illustrate the fire prevention work of the company.

R. B. Stearns, general manager of the company, then presented to Bert Hall the gold medal awarded by the association for the best paper presented by a member of a company section. In his presentation speech Mr. Stearns remarked that the section had entered the competition three times and had carried off the medal every time. Officers and privates of the National Guard next discussed experiences in the service of the federal government on the Mexican border, after which retiring president Dentz reviewed the work of the section for the year and outlined the possibilities for the coming year. During the evening a quartet consisting of Messrs. Olsen, Cook, Miller and Abendroth sang several times.

As this issue of the paper goes to press word is received of an enthusiastic joint meeting of the gas, railway and electric sections of the Newport News & Hampton Railway, Gas & Electric Company. Details will be given in a later issue.

COMMUNICATIONS

Enamelling vs. Painting and Varnishing Cars

UNION TRACTION COMPANY OF INDIANA.
ANDERSON, IND., Nov. 18, 1916.

To the Editors:

I have just noticed on page 1045 of your issue for Nov. 11 a short comment on car enamels and varnishes by Langdon B. Valentine. I am very much interested in this statement but cannot altogether agree with Mr. Valentine. Bear in mind that it is not my intention to doubt the correctness of his contention that the enamel process of painting does not make a first-class, lasting job of quality. While we have not perhaps made the elaborate or extensive tests which he claims to have made, yet our experience and opinion are quite the reverse.

We have some few cars to which we have applied the enamel process. These cars have been watched continually with great interest. The manufacturer has made great claims for his products, but we, like all the rest, are from Missouri. We had to be shown. We find, it is true, that with the enamel process the brilliant luster which the car has before it first leaves the paint shop is not retained, but this is the case regardless of whether a clear finishing varnish or the enamel process is used.

Our experience indicates that the life of car paint is largely if not wholly governed not only by the quality of varnish used but by the number of coats as well. We have some cars which we carried through the ordinary method of prime coats, service and colors, and finished with two and three coats of varnish. These cars were released about the same time from the paint shop that the cars were to which we gave the enamel process. The varnish used on these cars was conceded to be the very best that the market could produce. In less than thirty days the varnished car had lost its luster and did not even have an egg shell gloss. The enamel process, while it has lost its high luster, still maintains a beautiful egg shell gloss, and we predict that it will be necessary to revarnish the cars painted with the varnish system long before it will be necessary either to re-enamel or revarnish those painted with the enamel process.

We have had cars, as stated before, that after being thirty days out of the paint shop, even though they were cleaned all over once or twice a week with cleaning materials which in no way affects the varnish, looked as though they had not been revarnished for a period of a year or more.

The writer has begun to question whether such expensive methods of painting cars are worth while considering the amount of minor abrasions that they will receive in a season's run and the amount of touching-up which is necessary, especially as this touching-up usually demands a coat of color in order to make the car have a uniform appearance. It is the desire of almost every railway property to revarnish its cars every year, although conditions and financial situations arise which restrict the carrying out of this policy, and it is my belief that cheaper methods, whether it be material or process, are going to be compulsory to combat the ever-increasing price of labor and material.

I see no economy in revarnishing cars with expensive varnishes where the road is so fortunate as to have enough equipment to varnish it every year, but if the cost of materials and the method can be shortened it will enable the operator to get a greater number of cars and possibly all, through the paint shop every season. The tendency to-day is to economize in every way possible. It used to be that interurbans as well as city cars were dolled up with a lot of stripes and scroll work like a circus wagon, but the striping of cars on most properties has now been eliminated and the lettering is being reduced to the minimum.

In conclusion I would say, from the results obtained and with the conditions which must be met, that the enamel process is one which is worthy of the most careful consideration as I think it is the road not only to economical but to substantial car painting.

Recently we have painted a number of interurban cars with house paint. These were of a type that we only use on special occasions when traffic is extremely heavy. I consider that these cars look equally as well as the most expensive piece of work which we have put on, and I warrant that the luster and body of paint will last as long. If a car is to be varnished every year, the plan of giving a car a coat of house paint, which, at first thought, seems ridiculous, might not be such a joke after all. R. N. HEMMING,
Superintendent of Motive Power.

Side-Truss Construction for Railway Cars

L. B. STILLWELL
CONSULTING ENGINEERS
NEW YORK CITY, Dec. 7, 1916.

To the Editors:

We are much interested in reading in the ELECTRIC RAILWAY JOURNAL for Dec. 2 your editorial comment on the side-truss construction for railway cars, and are pleased to note that its great ability to resist distortion, or "weaving," in service, appeals to your judgment as being advantageous. In our opinion this feature of the side-truss construction is of the greatest importance, and becomes positively essential when the car body is extremely light, as distortion of a frail superstructure will soon land it in the repair shop. Your statement that the shock of impact between two cars is less than between long trains is obviously correct, but that the strength of superstructure is an important factor, even in case of collisions between two single cars, was apparent to all who saw the photographic record of wrecked cars exhibited at the Toledo meeting.

It is obvious that a car body structure that is designed to minimize destruction in case of derailment or collision will be capable of resisting any stress arising from even the most extreme service conditions. That the side-truss construction accomplishes this is demonstrated by several years' severe service record of several hundred cars. L. B. STILLWELL.

As a part of a campaign to teach children the dangers of taking "short cuts" over railroads, playing on the tracks or using railroad rights-of-way, bridges and trestles as highways, the Pennsylvania Railroad System has issued an illustrated calendar especially designed to appeal to young folks. The calendar is intended particularly for use in school rooms and will be supplied for that purpose throughout the cities, towns and country districts served by the Pennsylvania lines, both east and west of Pittsburgh.

Some Recent Advances in

EQUIPMENT AND ITS MAINTENANCE

This Week Too Master Mechanics Tell How They Handle Cars in the Shop and Keep Down Journal Troubles Respectively—Line and Cable Matters, and Crossing Safeguards Are also Covered in Several Articles

(*Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.*)

Testing Line Insulators

BY D. D. EWING
Associate Professor of Electric Railway Engineering, Purdue University, La Fayette, Ind.

There is considerable truth in the old saying, "Put a rotten apple in the barrel and it will spoil all of the rest." And the fundamental idea involved is as true of the insulators on a line as it is of the apples in a barrel. The failure of the weak member of a system affects the welfare of all of the other members. Line surges set up by the destructive breakdown of a deteriorated or damaged insulator are likely to damage other insulators, and thus the trouble once started becomes cumulative. The problem of insulator testing as it confronts the operating man, therefore, is largely the problem of weeding out the defective insulating units before they actually break down.

For this weeding out process two methods of field testing have recently come into considerable use—the megger test and the telephone receiver test. The megger test cannot be used on a live line, and the testing equipment is somewhat expensive. Moreover, this plan requires a larger crew and is a little slower than the telephone receiver test. The results secured with it, however, are more definite than those obtained by the other method and are not affected either by the presence of an overhead ground wire or by the type of supporting structure. It has become quite popular for field tests on high-voltage transmission lines, particularly where a duplicate line is available for carrying the load while tests are being made.

The telephone receiver test can be performed by one man, as the apparatus and the methods used are of the simplest. Since the indication given the operator depends upon the shunting of leakage or unbalanced capacity currents from the pole through a telephone receiver, this test must be performed with the line energized. This instead of being objectionable is one of the important advantages of the method, since tests for defective insulators can be made without taking the line out of service. In a modified form the method can be used with steel supporting structures, but the best results are obtained when the supporting structures are of wood and where no overhead ground wire is used on the line.

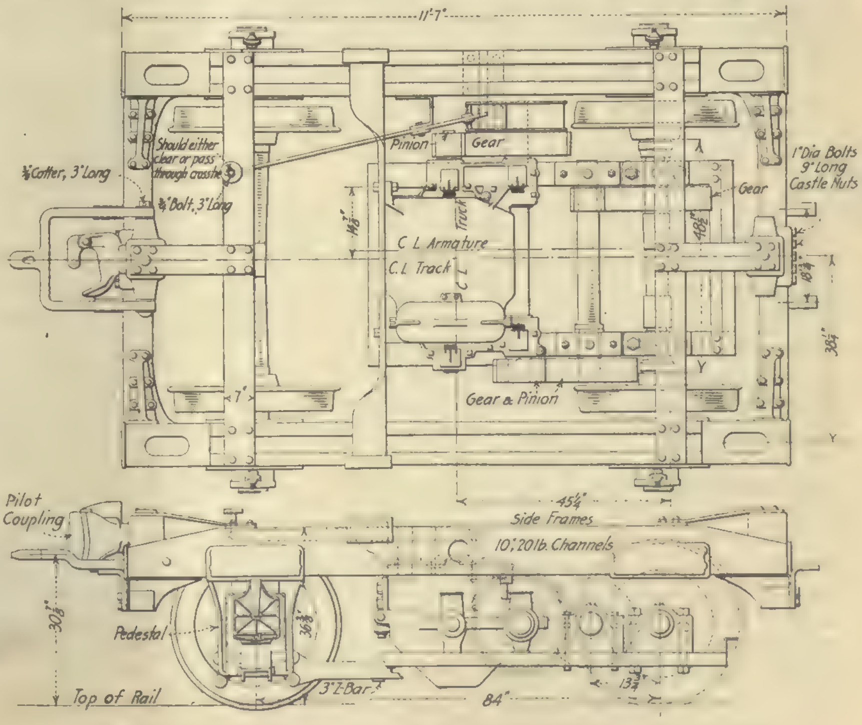
Continuity of service must prevail if trains are to be run in accordance with printed schedules and if desirable contracts for lighting and power service are to be secured. Poor line insulation, while not the only cause of service interruption, on many lines is an all too frequent cause. While experience has shown that no field test so far proposed is infallible, it has also shown that the consistent use of the method best adapted for a particular line eliminates to a large extent interruptions of service due to insulator troubles and decreases the average annual maintenance costs.

Handling Cars or Trucks with a Home-Made Electric Tractor

Present Equipment in the Long Island Railroad Shops Shows a Saving of 58 Per Cent on Each Truck Handled

BY J. S. MILLS
Foreman Electrical Department, Morris Park Shops, Long Island Railroad, Morris Park, N. Y.

The writer has noted with interest the articles in the ELECTRIC RAILWAY JOURNAL on handling cars and trucks in shops, particularly those entitled "Portable Controller Proves a Time-Saver" and "A Movable Carriage for Current Collection," which appeared in the issues for Sept. 30, 1916, page 685, and Oct. 28, 1916, page 939, respectively.



PLAN AND ELEVATION OF MP-54 TRUCKS EQUIPPED WITH MOTOR AND TRIPLE-REDUCTION GEARS

The layout of a shop, of course, has a great deal to do with the selection of the safest and cheapest method of doing this work. At the shops of this company an electric tractor was built and equipped for the purpose, and this has proven very satisfactory and has materially reduced the cost of the work. It consists of an MP-54 trailer truck with bolster guides and brake rigging removed, equipped with a GE-57 motor suspended on a carriage between the wheels. The power is transmitted through three sets of gears and pinions to one pair of wheels. A shaft upon which a gear and pinion is mounted extends beyond the bearings and a band brake wheel is mounted on the same axle, being operated by foot from the inside of the cab. An R-27 controller, cast-iron resistance grids, circuit breaker and sand boxes are all mounted inside of the cab.

ELECTRIC TRACTOR PULLING MOTOR-CAR OUT OF THE SHOP ONTO THE TRANSFER TABLE

In order to remove the cab from the truck it is only necessary to disconnect the four motor leads, and to remove one pin from the brake rigging and eight ½-in. bolts that pass through straps holding the body to the truck. The tractor is equipped with two drawheads suitable for coupling with the two types used by this company, one being a Van Dorn & Dutton type which turns back out of the way when not in use and the other a standard automatic coupler.

Each track in the electric shops of this company holds two small cars, with a clear passage at each end, or one large car with space for one set of trucks in front of the car. An electrically-operated transfer table, equipped with a third rail for the movement of cars on and off the table, is located outside of the building and extends between two wings of the shops.

The process of handling a car when the removal of trucks is involved is as follows: It is first run off the transfer table into the crane house under its own power, the car body is lifted from the trucks by a crane, a rope is hooked onto the rear truck and both trucks are pulled from beneath the car. This rope is operated by a drum which is driven, through a clutch, by the main driving motor on the transfer table. The electric tractor is then coupled to the trucks, and they are either placed in the truck shop or on adjoining stub tracks. The tractor then takes the car, which rests on dummy trucks, and places it in the electric car shop. When the cars are again ready for trucks the operation is reversed.

Between alternate tracks inside the door adjoining the transfer table a standard bus-line receptacle is installed and connected to the 600-volt supply through a circuit breaker, so that when the contact shoe on the tractor leaves the third-rail on the transfer table a short jumper with a standard bus-line head on one end and with a fork on the other can be inserted in the receptacle to furnish power for operation.

The saving in time effected by the use of this electric-tractor in handling trucks amounts to 58 per cent and in handling car bodies still more. By the old method of handling one set of trucks with rope and block six men for six minutes were required, while with the electric tractor it requires three men but five minutes. Between twenty-five and thirty sets of trucks are shopped each week and these must be handled twice and often three times. Another saving is in the amount of rope used on the transfer table. Formerly this hemp rope, which is 4¾ in. in diameter and 160 ft. long, had to be renewed about once a month, but since the electric tractor has been in service, about eight months, only one rope has been used and that is still in service.

It was feared that in speeding up the work more than 50 per cent more accidents would occur but since this motor car has been in service not a man has been injured on this work.

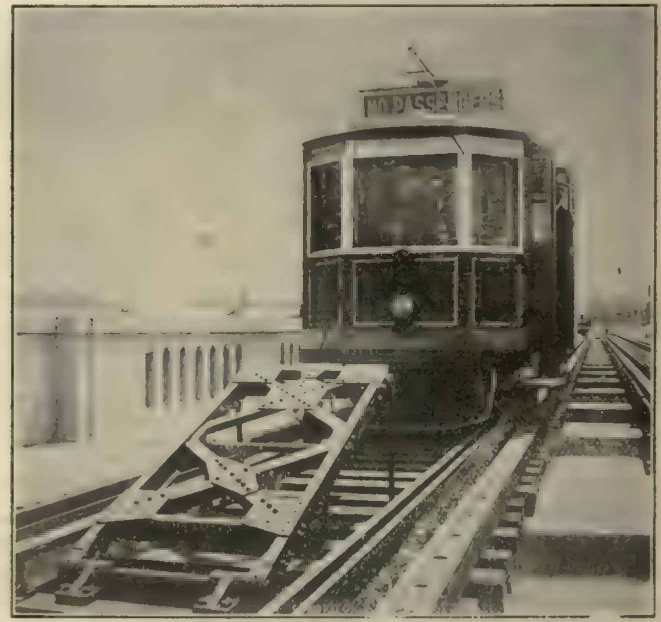
Safety Stop for Drawbridges and Grade Crossings

The Author Describes Several Devices for Safeguarding Traffic at Drawbridges and Grade Crossings

BY J. B. STRAUSS, C. E., CHICAGO, ILL.
President The Strauss Bascule Bridge Company.

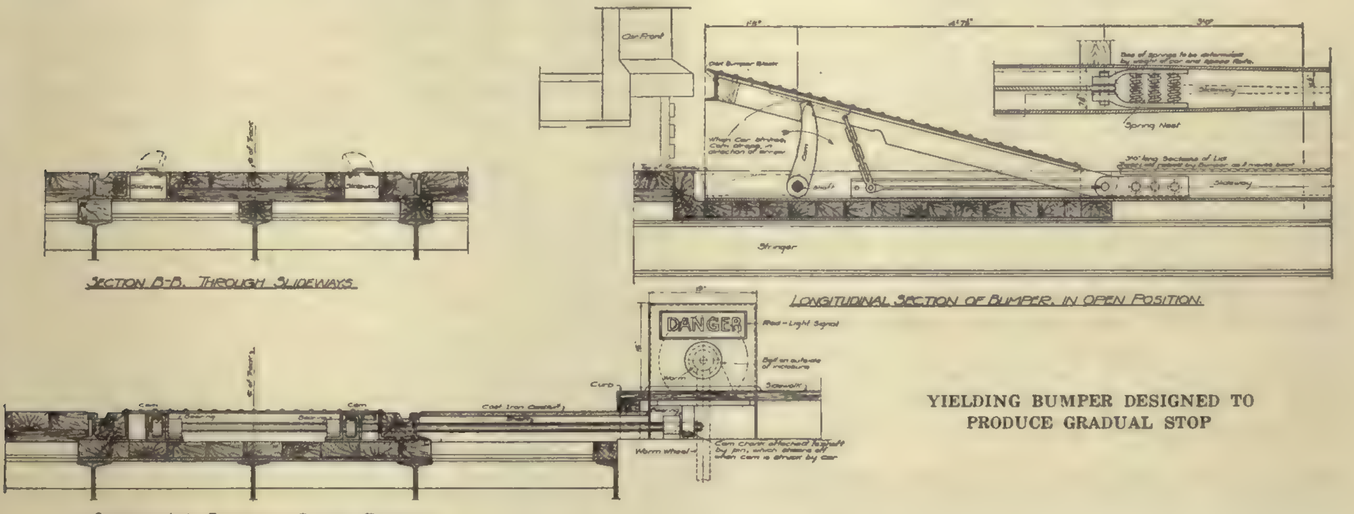
The recent fatal accidents in Boston, Chicago and Vancouver, due to open drawbridges, have proved the necessity for more effective means for removing this danger. The ideal gate or barrier is one that will stop any vehicle positively, but at the same time so gradually that the impact will cause no damage. The writer has spent several years developing and testing devices for this purpose and the following is a description of some of his designs.

One of these is an automatic bumper, intended for street car traffic across bridges and railway tracks where there is little speed or impact. This device comprises a heavy structural steel "striking frame," as shown in an accompanying illustration. This frame is pivotally mounted between the rails with its top below the rail



AUTOMATIC BUMPER RAISED TO STOP CAR ON APPROACH TO DRAWBRIDGE head when not in use. When traffic is to be stopped a motor lifts the striking frame so that it stands at an angle to the track, thus blocking traffic.

This form will not suffice where the speed of the car is high and the impact, therefore, heavy. For this condition a "yielding bumper" was developed, as is illustrated in the accompanying drawing. This form combines with the positive protection of the fixed bumper, a yielding element which permits movement when struck, thus offering a constantly increasing resistance until the car stops. The striking frame in the yielding bumper is mounted on a secondary traveling frame, which moves in slideways between the tracks, extending a distance of 50 ft. The slideways are made of two Z-bars, set so as to form wide slots. Spring shoes travel in these slots, these shoes being fastened to the toe of the traveling frame. The friction between these shoes and the inner surfaces of the slideways determines the force necessary to push the bumper along the track. The slideways are tapered so that their width at the far end is less than that at the other end, causing the friction between the shoes and the slideways to increase as the frame approaches the bridge. The strength of the springs may be changed for cars of different weights and speeds.


Car Front
Cast Bumper Block
When Car strikes, Cam drops in direction of arrow
Cam
Shaft
Spring Nest
Slideway
Stringer
DANGER
Red-Light Signal
Bell on outside of inclosure
Worm
Curb
Sidewalk
Cast Iron Conduit
Cam
Bearing
Worm wheel
Cam crank attached to shaft by pin, which shears off when cam is struck by car

SECTION B-B. THROUGH SLIDEWAYS

LONGITUDINAL SECTION OF BUMPER, IN OPEN POSITION.

SECTION A-A. BUMPER IN CLOSED POSITION.

YIELDING BUMPER DESIGNED TO PRODUCE GRADUAL STOP

In addition to the above, a cam is provided automatically to raise the striking frame when traffic is to be stopped. Ordinarily this serves as a signal and is sufficient to cause the motorman to stop his car. However, should a car get beyond control, its front sill will engage the striking frame, which, with the traveling frame, slides forward under the force of the car. The resistance increases as the speed decreases, and the car is brought to a gradual stop. In combination with this bumper, there is a danger light and a signal bell which are automatically operated when traffic is to be stopped.

These bumpers are intended especially for car traffic, so another device called a "yielding barrier" was developed for general highway protection. This barrier is made in two types, the one designated as the "portal" type, having a frame across the roadway, for the purpose of supporting the chain or cable and the machinery which operates it. The chain barrier proper consists of three horizontal chains or cables spaced and held in place by a web system of lighter chains. It can be raised and lowered by the operator in the operator's house. It is fastened at the ends to some form of shock absorber, which, in case the barrier is struck by a vehicle will permit the chain to pay out and gradually bring the vehicle to a stop.

In the other form of the yielding barrier, the portal or cross strut is omitted and the chains or cables are left exposed. Where street car traffic exists a center post must be provided in this type to support the trolley wires. Where there are no trolley wires, this center post is omitted and there are simply the two side posts. This type, from the standpoint of appearance, may be considered better than the portal or cross strut type. In this design the operating machinery for raising and lowering the barrier is located beneath the roadway in a closed compartment, which, however, is readily accessible for inspection and repairs. It will be noted that this does not interfere with the trolley wires in any respect, that it takes up very little space and that it is simple and direct in operation. All forms of this yielding form of gate or barrier are covered by patents issued to the author.

These devices have been developed to produce a satisfactory method for the elimination of accidents in all kinds of traffic. The old flimsy railway and bridge gates have proved themselves to be insufficient protection and it is believed that some yielding form of barrier must soon become generally adopted.

Small Steam Turbines in the Power Plant

Among recent applications of the steam turbine to power plant auxiliaries is one adapting it to the driving induced draft fans the speed of which is low compared with that of the turbine. The perfecting of high-speed reduction gears has made possible the use of turbine-driven fans and a considerable number are now in operation. The fans used generally require from 25 hp. to 50 hp. and give a draft of 2 in. to 5 in. In one type of unit developed by the Terry Steam Turbine Company the maximum turbine speed is 4500 r.p.m. and the gear ratio is 3.7:1. Another type has a maximum speed of 3630 r.p.m. for the turbine, with a gear ratio of approximately 6.8:1.

Another application is to exciter driving. An example is furnished by the three 300-kw. exciter units now being installed by the Buffalo General Electric Company. To insure the plant against loss of excitation, two independent sources of power are provided to drive each exciter, which are direct-connected to an induction motor at one end and to a Terry steam turbine at the other end. The governing mechanism of the turbine is so arranged that if power for the induction motor should fail the turbine will automatically pick up the load. An interesting feature is the high pressure and temperature supplied to the turbine (275 lb. and 275 deg. superheat).

Cutting Out Journal Troubles on an Interurban Road

The Author Gives a Formula for Journal Brasses and Describes Methods of Eliminating Hot Boxes, Loose Journals and Other Troubles

BY A. BLANCHARD
Master Mechanic Boston & Worcester Street Railway

Much progress has been made during the past year on the Boston & Worcester Street Railway in the direction of eliminating hot journals. These were formerly the source of much operating inconvenience on this system, the main line cars of which reach a maximum speed of about 45 m.p.h. on level track. For many years the company has manufactured its own journal brasses, but a study of the road's experience led to the conclusion that there were several causes for our hot journals, such as improper composition and improper design of journal brass, wornout wedges, worn motor suspensions (on old-style motors having three-point suspension), improper journal packing and excessive braking effort. The last-named is 150 per cent maximum, which we find necessary in order to make a quick stop with a loaded car on our long heavy grades, of which we have a great many.

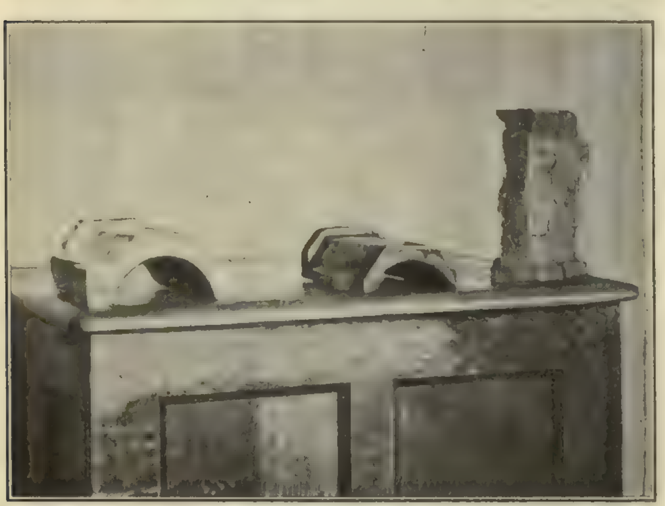


FIG. 1—(LEFT TO RIGHT) LATEST TYPE OF BRASS FOR SMALL CARS; EARLIER TYPE OF BRASS; BRASS CRACKED FROM OVERHEATING

Our first step was to find a mixture for our journal brasses, so that they would run cold from the start, without any lead lining, when properly fitted to the journal; also that it would not cut the axle when they did run hot. At the same time it could not be so soft that it would wear rapidly where the brass comes in contact with the wedge and sides of the journal box. After trying a great many different mixtures we found the following one would meet our requirements: Copper, 79 per cent; tin, 9 per cent; lead, 10 per cent, and phosphor copper, 2 per cent (containing 10 per cent of phosphorus).

Under ordinary conditions I consider it unnecessary to line brasses, but on account of the previous difficulties we have had with hot journals, which has caused a great many of our journals to become rough and hollow in the center, we are at present lining our brasses with 1/16-in. lead linings. We had considerable trouble in making the lining stick to the brass, as at first it would flake off or roll out, but we found the following practice would make the lining stick and prevent it from flaking off or rolling out. After boring the brass is heated, then painted with whiting, with the exception of the surface to be lined, to which surface we apply Reed's "Grade B" soldering flux. Then the whole brass is dipped in a bath of pure tin, after which it is put on an arbor while still warm and given 1/16 in. of lead lining.

Our second step was to find some way to stop the brasses from tipping and the button on the end of the journal from wearing a hole in the side of the journal box. We found that this was caused by the excessive braking effort that we were using, as when the brakes were applied the journal was pushed against the side of the journal box and in time wore a hole through it, and sometimes the brass would tip, causing it to wear as shown at right of Fig. 1. We overcame this trouble by designing our brasses as shown in Fig. 2. This brass cannot tip and will not allow the end of the axle to come in contact with the side of the journal box. As this brass will not allow the axle to increase its distance, to any great extent, from the center of the truck, we have not had any more hot journals caused by the motor suspension (on motors with three-point suspension) binding on the truck frame. On our larger cars we have four types of trucks in which we formerly used four types of journal brasses, but by making a slight change in some of the journal box wedges we are able to use one type of brass for all four types of trucks. Due to hot journals in the past, some of our journals had to be turned down, as they were very rough. The original size was 4¼-in. by 8-in. M.C.B. type. Therefore we have journals 4 3/16-in., 4⅛-in., and 4 1/16-in. diameter, and in lining our brasses we use four different sizes of arbors and stamp the brass according to its diameter.

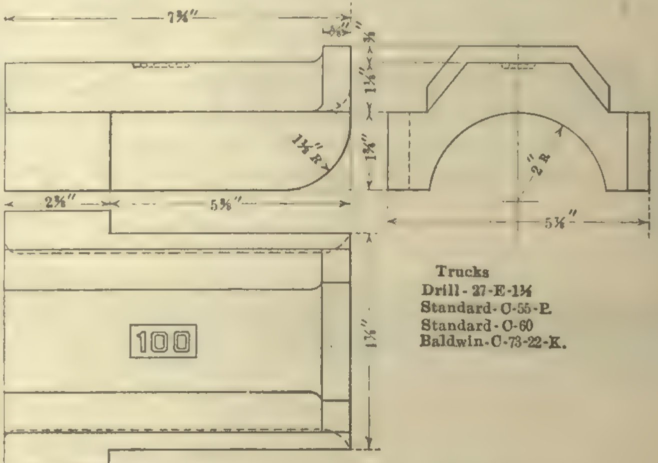


FIG. 2—REDESIGNED BRASS USED ON LARGEST CARS B. & W. ST. RY.

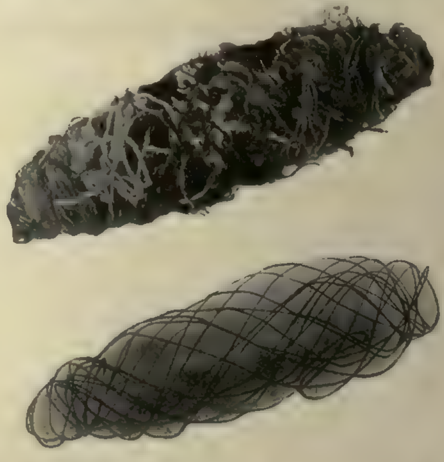


FIG. 3—ORDINARY AND X-RAY PHOTOGRAPHS OF SPECIAL PACKING

We had a great deal of trouble to find a suitable journal packing, one that would not pound away from the journals. We have adopted the "Elastic" car waste, manufactured by the Elastic Car Waste Company, Philadelphia, Pa. This waste is put up in different size rolls, which are woven with soft brass wire as shown in the illustration. We use the "Electric" size and put five rolls in each journal on our large cars, four under the journal and one at the end. This type of waste is more difficult to put into the box than the ordinary loose waste, but when once in place it is practically impossible for it to pound away from the journal. Before using, the elastic packing is saturated in Galena car oil for forty-eight hours and then drained twenty-four hours in a room at about 70 deg. Fahr. The rolls are then put into the journal box without additional oil. We have had some of this waste in service for over six months and have not added any additional oil or had to touch the initial installation.

Brasses have also been redesigned to fit our smaller cars, and the left-hand brass, Fig. 1, is one of these latest types remodeled in shape as indicated by comparison with the middle brass, which is the first of the new mixture to be placed in service. About 75 per cent of the cars are now fitted with improved brasses, and last Labor Day was the first holiday on which the company ever ran its service without a hot journal.

We expect to get at least four years' life per brass now compared with six months' maximum under the former practice, and the improvement in car service so far is most gratifying.

A Third-Rail Feeder Plug

The method of supplying current to the third-rail from the feeders on the Puget Sound Electric Railway, Tacoma, Wash., is shown in the illustration herewith. A tap from the feeder cable is led down the pole and run under the track through Orangeburg fiber conduit to the side of the third-rail. An insulated plug, made especially for the Puget Sound Electric Railway by the Standard Underground Cable Company, is attached to the top of the fiber conduit This plug, which is protected by a petticoat very similar to that of a high-tension insulator, has a bolt extending through the petticoat, which is threaded and takes a nut. The terminal of the third-rail connection fits down over the bolt and is held tightly in place by means of the nut.

CONNECTION FROM FEEDER TO THIRD RAIL SHOWING SPECIAL PLUG

Cable Faults Located by Small Portable Instrument

Practical Method of Locating Feeder Troubles Is Tried Out by Several Operating Companies

The location of cable faults is a problem common to all electric railways, and many companies have devoted considerable study to developing methods of locating their cable troubles. The method used in most instances to locate faults such as grounds or short-circuits between cables is to send an interrupted current through the defective cable, and then an exploring coil connected to a telephone receiver is applied to the cable at intervals along the line. If the exploring coil is between the fault and the source of the interrupted current a current will be induced in the exploring coil, causing a sound in the telephone receiver. If the sound is very weak or if none at all is heard it indicates that the exploring coil is beyond the fault. By continued trial it is thus possible to locate the trouble within a few feet.

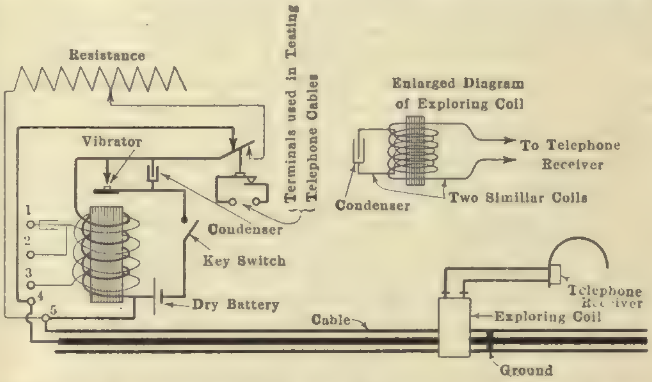


DIAGRAM OF INSTRUMENTS AND TESTING CONNECTIONS USED IN LOCATING CABLE FAULTS

An instrument called a "telefault" is used quite extensively for the purpose of detecting faults by the method just outlined. The design and adjustment of this instrument is such that the pulsating current which is sent through the cable causes a distinct tapping sound in the telephone receiver when the exploring coil to which it is attached is held close to the cable. This tapping is similar to the sound made by a woodpecker and it is an important feature of the instrument since it is essential that a characteristic sound be produced—one that can readily be detected from the humming sound which might be caused by induction from adjoining cables.

The accompanying illustration shows the wiring diagram and testing connections which are used in locating cable grounds and short-circuits. A single dry cell is connected in series with a key switch, a vibrating current-interrupter and the primary winding of an induction coil. A condenser is connected across the interrupter contacts to absorb the spark. There is also a secondary winding on the induction coil and a set of resistances for locating troubles in telephone and signal cables, but these resistances are not used for testing for power cable troubles.

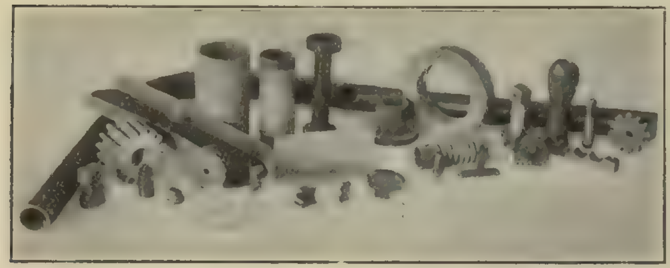
The pressing of the key switch causes the vibrator to operate, and a pulsating current is sent through the cable to the point where the cable is grounded to the sheath. The sheath then forms the return circuit back to the instrument. The exploring coil consists of two exactly similar coils of fine wire wound on a laminated iron core. As shown in the diagram the terminals of one coil are connected to a condenser, and the other coil is connected to a telephone receiver. The coils and condenser are mounted in the same case. This is made of bakelite and is small enough to be easily held against the cable with one hand. The operator in search of a fault applies the exploring coil to the cable at intervals along the route, and the characteristic tapping sound is heard until a point in the cable is reached where a sound is heard on one side, but where none is heard on the other. This is the location of the trouble.

A test of the instrument was made by the New York Edison Company. In this case a three-conductor 250,000-circ. mil cable was shorted by a 3000-ohm resistance placed at a point unknown to the testers. This short-circuit was located in two hours and thirty minutes at a point about 4 miles from the substation. Only six manholes along the line were entered in making the test. In trying out the telefault the Interborough Rapid Transit Company of New York City used it in locating a ground in a single conductor, lead covered, 2,000,000-circ. mil cable.

Other tests of a similar nature have been made, and the companies that have used the instrument believe that it saves much time in locating cable faults. It has been pointed out that the sound heard in the telephone receiver is a tapping like that of a woodpecker, for this reason its makers, W. N. Matthews & Brother of St. Louis, Mo., have named it the "Woodpecker Telefault."

A New Electrical Insulation

A new form of electrical insulating material called "Condensite-Cellulac" is being placed on the market by the Diamond State Fiber Company, Bridgeport, Pa. This material is said to be entirely different in physical and chemical characteristics from any other form of fiber, hard rubber, mica or synthetic insulation. It is said further to combine in great part the stable physical and chemical properties, and high dielectric resistance of condensite, which is employed in its manufacture, and the good qualities of the best grade of vulcanized fiber. These properties are summarized by the manufacturers thus: It is permanently anhydrous and non-hygroscopic, and is impervious to the action of oil and ordinary acids or solvents. It is infusible and is not affected by the action of heat within the range of temperature ordinarily encountered. It is not fragile and will stand considerable vibration or shock.



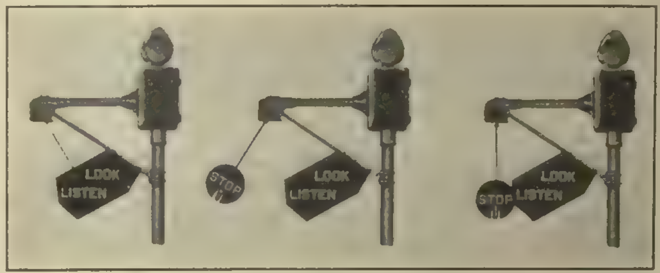
SHAPES IN WHICH NEW INSULATING MATERIAL IS ALREADY BEING MOLDED

This insulating material is furnished in merchantable shapes, sheets, rods, tubes, etc., and is readily machined. It may be formed into very thin sheets (0.015 in. or less in thickness). It can also be supplied in the soft uncured state, permitting of its being hardened in the place in which it is to be used, as for instance, in making gaskets for hot lines, steam, hot water, compressed air, etc.

Three-Aspect Automatic Flagman

A special type of visual signal to protect dangerous grade crossings has been developed by the Union Switch & Signal Company, Swissvale, Pa., which, while displaying a "stop" indication by the movement of a disk in normal operation, is so designed that a failure of any part of the apparatus or the absence of power will cause a second or emergency "stop" indication. In other words, this signal has three aspects, one indicating "proceed," and either of the other two indicating "stop," as shown in the accompanying illustration.

Under normal conditions this flagman indicates the approach of a train by swinging a red banner on which appears the word "stop," and displays a red light attached to the banner. When no train is approaching the banner is held to one side between two screens upon which is painted the phrase "look and listen," and the lamp suspended from the banner is not lighted. If the circuit through the holding magnets is broken, but the apparatus is otherwise in good condition, the banner will swing irrespective of the approach of a train. If the circuit is broken through the operating magnet but not through the holding magnet the banner will be retained in its extreme position between the screens until a train approaches when it will be released and ultimately assume a vertical position with the banner stationary but fully displayed. If current is totally cut off the mechanism, or if the operating parts become disconnected, the banner will also assume the vertical position and be fully displayed.



THREE ASPECT FLAGMAN—FIRST POSITION—PROCEED; SECOND POSITION—SIGNAL SWINGING, STOP; THIRD POSITION—SIGNAL HANGING VERTICAL, STOP

The operating mechanism is inclosed in a weatherproof case and consists essentially of operating magnets for driving the swinging banner and of holding magnets for retaining the banner at one end of its arc of travel.

This flagman is designed to operate normally at 10 volts direct current. It requires an average of 0.4 amp. for swinging the banner, and 0.4 amp. for the 5-watt 12-volt lamp while the banner is swinging. The holding magnets require normally 10 milliamp. when the flagman is latched in the clear position. The signal can be equipped with a bell for further protection. The control of the flagman can be effected by any of the well-known automatic or non-automatic methods.

The Kansas City, Clay County & St. Joseph Railway has contracted for an electric locomotive. The company will install in the locomotive the present motor equipment of its work car, using the steel frame of that car for the ditcher. The locomotive is needed to haul the ditcher and upkeep equipment, the freight cars transferred from steam lines, and the company's freight cars.

NEWS OF ELECTRIC RAILWAYS

Traffic and Transportation
Financial and Corporate
Personal Mention
Construction News

ST. LOUIS SETTLEMENT SUGGESTION COMMENT

Principal St. Louis Papers Agreed that Long-Time Settlement Is Desirable—President McCulloch Discussed Problem

The proposal made by the United Railways, St. Louis, Mo., to the city for a settlement of the differences between the company and the city, referred to at length in the ELECTRIC RAILWAY JOURNAL for Dec. 2, page 1170, has provoked much public discussion of the street railway question. Quite naturally, differences of opinion exist as to what seems best to be done, but such opinions as have been expressed contain no elements that would seem to prevent their reconciliation.

On one principal point the two leading daily papers, the *Post-Dispatch* and the *Republic*, are agreed, namely, that any temporary expedient is inadvisable. In this connection the *Republic* says that "the city should go to the bottom of the question having in mind the settlement not only of the troubles which are now worrying the company, but also of the future of street railroading in St. Louis, which future should be considered in the light of what other cities have accomplished in the way of bettering service or reducing fares." Similarly the *Post-Dispatch* says that "the adjustment merely of surface differences will leave the problem unsolved." It makes a plea for provision for subways and extensions in the city and suburbs, and says that the only satisfactory settlement will limit the earnings of the company to fair returns on a fair valuation and devote all earnings in excess of that to a fund for real rapid transit.

The *Republic* seems to think that there is a disposition on the part of the Mayor to hasten the proceedings and get the question out of the way as soon as possible. In this it "does not see promise of a satisfactory adjustment of the question."

Many subjects affecting the company closely were discussed by Richard McCulloch, president and general manager of the company, in an interview with a representative of the *Post-Dispatch*, published in that paper for Nov. 25. Mr. McCulloch said that he would be glad to present to the directors the suggestion that the city have a representative on the railway board with full voting power and such other rights as were enjoyed by other directors. He did not see, however, how it would be possible for the city to have a representative in the operating department of the company. Control of the company was lodged with the Public Service Commission, but if the State would delegate power to the city to create such an official he would recommend the proposal to the directors.

Mr. McCulloch said that the capitalization of the company could be reduced only by a financial readjustment agreed upon mutually by the security holders or through receivership and foreclosure. The company had outstanding approximately $40,000,000 of stock and $60,000,000 of bonds. Considering intangibles and obsolescence due to the rapid changes in the street railway art with the attending need for superseding equipment before it had anything like outlived its usefulness, he did not think the total of securities outstanding was excessive.

The *Post-Dispatch* had advocated editorially a return to the company limited to 5 per cent. Mr. McCulloch said that with any such condition as this imposed the company would not be able to compete for capital in the financial markets with other forms of investments and that it would be unable to secure the new capital that was constantly required. With respect to the traction settlement of 1907 in Chicago and the much more recent settlement in Kansas City, he personally liked the principle, because it made the city and the company partners and insured co-operation between them.

ELECTRIC RAILWAY LABOR SHORTAGE ACUTE

City and Suburban Lines Find It Increasingly Difficult to Secure Satisfactory Help

Although this is ordinarily the time of year when there is, if anything, a surplus of labor in the electric railway field, reports from a number of Eastern and Middle West cities indicate that some of the companies have actually had to abandon plans which they had in preparation for the expansion and betterment of their service. The strike in New York has been over now for weeks, so far as the railways are concerned, but the plans of the companies for resuming operations in full were delayed considerably on account of inability to secure men of the high standard fixed for the arduous metropolitan service.

Among the other large cities that report man shortage are Washington and Cleveland. But this is not all. Even the lines in semi-metropolitan and rural districts are reporting labor shortages. The Connecticut Company, in particular, has been hard hit in this respect. The call for men from other industries has been insistent now for months in Bridgeport, New Haven, Hartford, and other places in Connecticut where machinery and tool-making are the principal industries. J. K. Punderford, general manager of the Connecticut Company, says that motormen especially have quit to go into the factories.

In Cleveland, the question of labor shortage has been brought out forcibly by the demand for increased service there on some of the lines. There the amount of service given and the fare question are almost inextricably mixed under the Tayler franchise, by which the service is under the control of the city street railway commissioner. Yielding to persistent demand from the public and the newspapers, that official has consented to those increases in service which have been most persistently urged, but now that this has been done the question up for settlement is that of securing the men for the cars. The commissioner said recently that the demand for men in other work was so great, and the wages so high, that men would not take places on the cars at the wages the railway could pay.

So acute did the labor shortage become in Washington, D. C., that the Washington Railway & Electric Company resorted to an ingenious scheme of advertising calculated to increase applications for employment and bring the instruction department to a normal condition. Letters were mailed to more than 660 postmasters in Maryland and Virginia, in which the company said that it had recently received communications from residents of the vicinity of the particular postmaster addressed asking for information relative to securing employment with the company. The company then said to the postmaster that in order to be of material service to those in his vicinity who might be interested it would appreciate his posting on the post-office bulletin board a circular which was inclosed informing those interested how to apply for employment without the necessity of going to Washington. This poster accentuated the fact of steady employment at from $45 to $80 a month. The inquiries that these posters provoked were answered promptly by the railway with a letter suggesting an appointment for a personal interview. With this letter went a circular giving the necessary qualifications for appointment, the cost to enter the service and the rates of pay.

The Washington Railway & Electric Company up to Dec. 6 had applications for employment from forty-three men who read the circular posted on the bulletin boards of rural post offices. The expense of the trial to the company was only $30.50, $12 of which was for postage. The opinion prevails in the company that the plan is better than paid advertising in country newspapers and that it brings a better class of applicants for permanent employment.

ACTION URGED UPON CITY OF SEATTLE

The legal department of the city of Seattle, Wash., has been instructed by the franchise committee of the Council to bring suit against the Puget Sound Traction, Light & Power Company to require the company to pave its right-of-way. The committee of the Council acted upon the opinion of Walter F. Meier, assistant corporation counsel, who stated that the city has the right to force the company to comply with its franchise provisions, notwithstanding its appeal to the Public Service Commission for relief from such requirements.

This action is in conflict with an agreement entered into more than a year ago, when officials of the company conferred with Mayor H. C. Gill and other city officials. At that time, the company paid its 2 per cent gross earning tax under protest, and agreed to continue these payments until the Public Service Commission disposed of its petition, the amounts to be refunded in the event that the relief sought by the company was granted and confirmed by the courts. At that conference, it was also agreed that instead of paving right-of-way, the company should be required to plank such parts of the street, until the petition to the Public Service Commission had been acted upon. Accordingly the company planked its right-of-way in a number of improvement districts where the franchise required paving with the same material and at the same time the city paved the remainder of the street. In these districts, the company pleaded its petition to the commission as an excuse for not complying with the letter of the franchise.

The relief petition of the company to the commission asked that the company be relieved of paving its right-of-way, of paying 2 per cent of its gross earnings to the city annually, and of paying any of the cost of bridges used for street railway purposes. The petition has been pending nearly two years. Counsel Meier holds that the application to the commission does not relieve the company from complete compliance with the terms of its franchises until the petition has been acted upon and the relief prayed for has been granted. It has not been determined in what district the company will be cited to remove the planking and pave its right-of-way with the same kind of material used on the remainder of the street.

The utilities committee of the Council has taken up with A. W. Leonard, president of the Puget Sound Traction, Light & Power Company, the question of the company contributing toward the cost of constructing the proposed viaduct and bridge on West Spokane Street and across the West Waterway.

NEW TERMINAL FOR INDIANAPOLIS

An important stage in the development of the interurban lines operating out of the city of Indianapolis, Ind., was marked during the week ended Dec. 9 by the purchase by the Terre Haute, Indianapolis & Eastern Traction Company of the Federal League Ball Park in Indianapolis. The park comprises about seven acres of ground within a few squares of the central business district of the city, and is to be used as a site for new interurban freight terminals for all the interurban lines entering Indianapolis. The three freight houses adjoining the Traction Terminal Building and passenger station at Indianapolis have for some time past proved inadequate to handle the increasing volume of freight business.

The new property is valued by real estate men at approximately $250,000, and has a frontage of 600 ft. on Kentucky Avenue, making it accessible for all traction lines entering the city as well as for manufactories and other shippers. The facilities for handling interurban freight in Indianapolis will be more than doubled when the new freight stations are completed.

The work of removing the grandstands and other structures on the ground formerly occupied as a baseball park will commence at once, and plans are now being made for the new buildings to be erected by the Terre Haute, Indianapolis & Eastern Traction Company. These new freight stations will be of brick construction, as attractive architecturally as possible. Proper track facilities, storage and transfer houses will be provided. The work on the new buildings will probably commence in the spring of next year.

BOSTON TUNNEL EXTENSION OPENED

The extension of the Dorchester tunnel of the Boston (Mass.) Elevated Railway from Washington Street to Dewey Square was opened for traffic on Dec. 3. Although the length of tunnel placed in commission is only ¼ mile, the new service represents one of the most important improvements in rapid transit from the standpoint of public convenience that has been completed by the Boston Transit Commission during the last few years. With the exception of the East Boston tunnel, Boston has had no crosstown rapid transit line of major importance running east and west, although the Atlantic Avenue elevated line has to some degree compensated for this condition by the loop and inter-terminal service operated upon it in the course of its history. The Dorchester tunnel, when completed, will enable high-speed train service to be rendered between Harvard Square, Cambridge, and Andrew Square, Dorchester, the section between Harvard Square and Park Street being popularly known as the Cambridge subway. In order to accommodate the public as far as possible in advance of the completion of the tunnel, the Boston Elevated Railway has established service in the downtown sections of this tunnel as rapidly as the completion of stations has permitted. Under this plan trains were operated from Harvard Square to Washington station following the completion of the tunnel under Winter and part of Summer Street, and the further extension of service to South Station under the present terminal point provides rapid transit from Cambridge and the various suburbs at the west of the Charles River to the South Terminal Station of the New York, New Haven & Hartford and Boston & Albany railroads.

EXPERIENCE ORDINANCE UNCONSTITUTIONAL

Judge Joseph H. Beall of the City Court of Yonkers, N. Y., on Dec. 1, declared unconstitutional the fifteen-day ordinance, which forbids the operation of a trolley car in that city by men not having had that period of instruction in that city. In the decision Judge Beall said:

"The so-called experience ordinance should be declared invalid for its very obscurity. No man can tell what it means. And no man's reputation and liberty should be placed at stake by a law which neither the author of it nor any other person, including the court, can understand. This decision has no relationship to the strike in this city, except to take into consideration existing conditions. It relates purely to an interpretation of this ordinance as exercised by the Council of the police power which could only be exercised in behalf of all the people of the city and not of any class. One of the first requisites of any law or ordinance is that it be reasonable, and this ordinance is not reasonable."

"Nothing is reasonable which threatens a community with ruin. And in connection with that phase of the matter it is right that the court should take judicial notice of conditions which have existed in this city for a number of months; the practical paralysis of the means of transportation for a long period of time, the discomfort and inconvenience that have resulted, the accidents to life and limb and property, the peril and expense of the child on its way to school and the laborer to his work, the grave and serious injury to all forms of business, the deadening effect upon and the irreparable loss to all holdings of real estate, the necessary withdrawal of the police from the ordinary avenues of their work, and, most of all, the nation-wide blot upon the fame and reputation of the city, which is ineffaceable."

Judge Beall's decision was rendered in the case of Louis Schwam, a motorman, who was arrested on complaint of Samuel Hoey, president of the local of the Amalgamated Association in Yonkers, who alleged that Schwam had not been trained for the period stipulated in the ordinance. Assistant Corporation Counsel Cohen of Yonkers was quoted to the effect that the city could not appeal from the decision, as it was returned in a criminal case, and that, as the defendant had no interest in taking the case to a higher court, the decision would stand.

Mount Vernon and New Rochelle repealed similar ordinances lately, as a result of the recent strike on the lines of the Yonkers Railroad and the Union Railway, New York, included in the system of the Third Avenue Railway. The Common Council of Yonkers refused to do so.

MESSRS. BEMIS AND BURCH TESTIFY IN CLEVELAND

E. W. Bemis testified on Nov. 27 before the board of arbitrators which is to decide on the power contract between the Cleveland (Ohio) Railway and the Cleveland Electric Illuminating Company. He said that money was not all that was involved in the differences between the company and the city. The question should be decided in a way that was for the best interests of the city. The welfare of the municipal light company should be considered, as well as the welfare of the railway.

Edward P. Burch, engineer in the employ of the city, and F. W. Ballard, former commissioner of light and heat, witnesses for the city, both testified that the railway would save money in the long run by accepting the bid of the municipal light plant. They argued that the cost of producing energy was steadily going down and that no contract that might continue for eighteen years should be made. Mr. Burch said that the saving under the bid of the municipal plant would be $355,000 and that the railway's own figures showed that it would lose $15,000 by taking the Illuminating Company's contract.

Mr. Burch testified before the board on Dec. 4 to the effect that the municipal plant is economically and efficiently handled and that it will be in a position within two years to supply the Cleveland Railway with all the power needed. He was the last witness for the city in the hearing. There will be some testimony in rebuttal.

DALLAS VOTE FAVORS LOCAL CONTROL

The final count on Dec. 6 of the postcard vote on the Dallas traction and lighting franchises showed the total of ballots cast to be 15,422. Of this number only 10,474 were found eligible. The vote in favor of the franchises was 9896 and against them 578. Mayor Lindsley and the City Commissioners announced that the franchises unamended would be passed on Dec. 8. Petitions are being circulated for a referendum election on the franchises after their passage by the commissioners.

The plan for the settlement of the differences in Dallas provides for new franchises to the consolidated street railways and the new lighting company to be organized by J. F. Strickland and C. W. Hobson, under which the control and management of the properties will be vested with local Dallas interests. The vote shows the desire of the public to keep the operation of public utilities in private hands where capital shows a desire to operate the properties in the best interests of all.

New York Road to Be Scrapped.—No efforts will be made to electrify the Wellsville & Buffalo Railroad, which has been abandoned after ten months' unsuccessful operation. Construction gangs have already started to take up the rails at several points. The equipment will probably be scrapped.

Strike in Marion.—The night force of motormen and conductors on the Marion (Ohio) Street Railway stopped work on Nov. 22, because of the discharge of a motorman. Once out, they demanded an increase in wages. The company offered to take the men back at the schedule of wages which prevailed before the strike.

President on the Railroads.—President Wilson in his address to Congress confined himself largely to the pressing railroad problem. He made it clear that he had not abandoned his program of legislation to prevent a recurrence of the situation that confronted the country recently through the prospect of a disastrous strike of railway trainmen. He reiterated all except one of the recommendations concerning railway conditions which he laid before Congress last summer when the general railroad strike threatened.

East Cleveland Will Push Paving Case.—Common Pleas Judge Levine has set Dec. 15 as the date for hearing the case of the city of East Cleveland, Ohio, against the Cleveland Railway in an effort to compel the latter to pave the 15-ft. space occupied by its tracks on Euclid Avenue the entire distance through the town. A similar suit was brought last spring, but Judge Levine ruled that the city could not ask the company to make improvements until the town itself had started the work. It is now almost finished with the exception of the portion occupied by the tracks.

An Electric Railway Roll of Honor Man.—James W. Drury, who had served for many years as a motorman on the lines of the Louisville & Southern Indiana Traction Company, died at his home in New Albany, Ind., on Nov. 16. Mr. Drury started to work with the Louisville & Southern Indiana Traction Company in 1887 on the first mule car in the city of New Albany. In 1903 he ran the first interurban car for the company through Jeffersonville to Louisville. In all of the twenty-five years with the company he was never inside a courthouse and had never had an accident charged to him.

Paving Suit Won by Company.—Supreme Court Justice Lehman has dismissed an action by the city of New York to recover the cost of tearing up the tracks of the Third Avenue Railway for the purpose of repairing a sewer. It has been the custom to charge the cost of removing and relaying the tracks to the railway companies, but when a bill for $1,008 was handed to F. W. Whitridge, president of the Third Avenue Railway, he refused to pay. The city's practice was based on a statute of 1884, but Justice Lehman ruled that the Legislature could not have intended to make a charge against a railroad in a case where the company was not responsible for the damage the city was compelled to repair.

Pass Law Retroactive.—Under the ruling of the attorney-general of Kentucky many public officials of Kentucky will have to decide by New Year's whether they will give up their passes on railway lines or give up their public offices. This applies to employees of the railways who are as such entitled to passes, but who also are frequently serving the public in some capacity, many without salaries. Numbers of railway employees who will be affected, for instance, live in suburbs and serve without pay on school district boards, town trustee boards, etc., seldom with emoluments. By the terms of the anti-pass law effective on Jan. 1 the State is depriving itself of the services of these men, few of whom can afford to give up their passes in the interests of the public.

Montreal Negotiations to Be Investigated.—As a result of a petition signed by 106 electors of Montreal, Canada, Justice J. M. McDougall of the Superior Court for the district of Ottawa and the county of Argenteuil, Quebec, has been appointed by the Superior Court to investigate the relations existing between civic authorities of Montreal and the Montreal Tramways. In the petition it is charged that the tramway has attempted unduly to influence the action of at least one civic official; that certain proposals, said to be unfair, for the granting of a new franchise to the company were prepared by the company for submission to the Board of Control, and that for the purpose of eliminating unfavorable newspaper criticism, the company secured control of certain newspapers and attempted to obtain control of others. The negotiations between the city and the company were referred to in the ELECTRIC RAILWAY JOURNAL for Dec. 2, page 1173.

Coming Public Service Commission Appointment.—Guesses are already being made as to the disposition Governor Whitman of New York will make of the four vacancies that will have to be filled by him on the Public Service Commissions during his second administration. Of these the place on the commission for the First District, now occupied by Commissioner Charles S. Hervey, who was appointed this year to fill out an unexpired term, will become vacant on Feb. 1 next year, as will the place of Devoe P. Hodson, an Erie County Democrat appointed by Governor Sulzer, on the up-State commission. On Feb. 1, 1918, the term of Oscar S. Straus, who succeeded Edward E. McCall as chairman of the Commission for the First District, will expire, together with that of Seymour Van Santvoord, chairman of the up-State commission. Governor Whitman has already announced that he will reappoint Commissioner Hervey, but beyond that nothing is known in public of his plans.

Toledo Fare Suggestions.—The sliding scale of fares for Toledo, Ohio, as prepared by Henry L. Doherty of the Toledo Railways & Light Company, starts with a 5-cent straight cash fare and free transfers; then six tickets for 25 cents and transfers only on 5-cent cash fares; six tickets for 25 cents and free transfers; seven tickets for 25 cents and 1 cent for transfers; eight tickets for 25 cents and 1 cent for transfers, eight tickets for 25 cents and 1 cent for transfers, with rebate of 1 cent on transfers; eight tickets for 25 cents and free transfers; five tickets for 15 cents. Under the plan of carrying an equalization fund, the fare will be reduced to the next lower point when this fund reaches $200,000 and will be increased to the next higher rate when it reaches a minimum of $100,000.

PROGRAMS OF ASSOCIATION MEETINGS

Pennsylvania Street Railway Association

Final plans are being made for the meeting of the Pennsylvania Street Railway Association on Dec. 12 and 13 at the Adelphia Hotel, Philadelphia. The session on Dec. 12 will be devoted to a discussion of insurance questions, while at the session on Dec. 13, taxation, lightning protection, electric welding, the jitney and the electric railway in mobilization will be considered.

National Fire Protection Association

The biennial meeting of the electrical committee of the National Fire Protection Association will be held in March, 1917, in New York City, the day and place of the meeting to be announced later. As usual, the provisions of the national electrical code as they now exist will be considered, together with reports of all sub-committees. Suggestions for amendments to the code, in order to be included in the bulletin, must be specific, and where a change is desired in a rule or section of a rule definite wording for such change must be given, together with the reasons why the change is recommended and these suggestions, together with all committee reports, must be in the hands of Ralph Sweetland, secretary of the electrical committee of the association, 141 Milk Street, Boston, Mass., not later than Jan. 15, 1917. As heretofore, the meeting will be open to all interested and such persons will not only be welcome but are urged to be present and give the committee the advantage of their experience and advice.

New York Railroad Club

The list of papers for the ensuing season of the New York Railroad Club, with the exception of the month of May, is as follows:

December, 1916—No paper. Annual Christmas entertainment, Waldorf-Astoria.

January, 1917—"Accident Prevention," with motion pictures of "The House That Jack Built." By Marcus N. Dow, general safety agent of the New York Central Railroad.

February, 1917—"Cost Accounting." By Henry Lehn, maintenance of way accountant of the New York Central Railroad.

March, 1917—Annual Electrical Night. "Electrification of the Norfolk & Western Railroad," with particular reference to economic and operating features thereof, with moving pictures by the Westinghouse Electric & Manufacturing Company, to be described by an operating official of the railroad company. C. H. Quinn, chief electrical engineer, will be invited to prepare a paper descriptive of the more interesting and peculiar engineering and structural features. By L. E. Johnson, president of the Norfolk & Western Railroad.

"Economic and Operating Features of the Electrification of the Chicago, Milwaukee & St. Paul Railroad, with moving picture illustrations by the General Electric Company, described by an operating official of the railroad. Mr. Beeukes, electrical engineer, has been invited to prepare a paper on the peculiar engineering and structural features. By C. A. Goodnow, assistant to the president of the Chicago, Milwaukee & St. Paul Railroad.

April, 1917—"Railway Water Supply." By C. R. Knowles, Chicago, superintendent of water service of the Illinois Central Railroad.

Financial and Corporate

ANNUAL REPORT

United Railways Investment Company

The income statement of the United Railways Investment Company, San Francisco, Cal., showing the net income applicable to its common stock when the company and its subsidiaries are considered as one, is as follows for the year ended June 30, 1916:

Gross earnings	$34,495,572
Operating expenses	$17,037,090
Taxes	1,479,258
Total	$18,516,348
Net earnings	$15,979,224
Other income	402,906
Gross income	$16,382,130
Deductions from income (rents, miscellaneous interest, etc.)	3,858,887
Income before deducting fixed charges	$12,523,243
Fixed charges—interest on bonds, notes, etc., held by the public	*6,179,063
Net income	$6,344,180
Dividends on preferred stock held by public	†1,738,901
Balance available for improvements, etc., and dividends on common stock	$4,605,279
Improvements, etc., charged against income by the several companies	1,775,007
Balance available for dividends on common stock	$2,830,272
Proportion applicable to common stock of United Railways Investment Company (5.025 per cent)	1,025,119

Note: The foregoing statement includes no charges for depreciation, as such, and no amounts charged against income for sinking fund requirements.

*Includes $186,138 interest on Series "B" second mortgage 5 per cent bonds of Sierra & San Francisco Power Company, payable in like bonds.

†Includes $799,130 for dividend on United Railways Investment Company preferred stock, although none was declared during the year.

In the preceding year the gross earnings, according to a similar statement before published, amounted to $32 574,111, and the income available for dividends was $2,071,423, of which $828,705 was applicable to common stock of the United Railways Investment Company, at the rate of 4.062 per cent.

Owing to an apparent lack of understanding by stockholders and the public in regard to the structure of the United Railways Investment Company, the report this year by means of an organization chart and a detailed description shows the exact inter-relations of the various companies. The United Railways Investment Company is solely a holding company, having interests in two widely separated districts, around Pittsburgh and in California. Its interests in the Pittsburgh district are represented by holdings of stock in the Philadelphia Company, which in turn controls the Pittsburgh Railways, the Duquesne Light Company, the Equitable Gas Company and the Pittsburgh & West Virginia Gas Company. The interests of the United Railways Investment Company in California, however, are represented by its holdings of stocks of the California Railway & Power Company, which controls the United Railroads of San Francisco, the Sierra & San Francisco Power Company and the Coast Valleys Gas & Electric Company. The Pittsburgh situation and the California situation are entirely separate, neither having any direct relation with the other, but each being operated and accounted for as a distinct entity.

The last fiscal year of the Philadelphia Company showed a revival of business in the Pittsburgh district, with the result that the company was able to increase its common stock dividend rate from 6 per cent to its normal rate of 7 per cent. The income of the company from the holdings of income debentures of the Pittsburgh Railways increased from $330,739 to $600,000. The latest detailed comparative statement for the Pittsburgh Railways, whose fiscal year ends March 31 as in the case of other parts of the Philadelphia Company group, was published in the ELECTRIC RAILWAY JOURNAL of July 22, page 159.

In contrast to the dividend increase in the Pittsburgh district, the common and preferred issues of the California Railway & Power Company are at present paying no dividends at all. The income of this company for the year ended June 30, 1916, amounted to $203,327, with expenses of $36,947. After the payment of the regular 7 per cent dividend on the prior preference stock, there was a profit and loss surplus of $14,013.

Of the various companies in the California group the one of chief interest to the electric railway field is the United Railroads of San Francisco. How this has fared lately is shown by the following comparative income statement for the years ended June 30, 1915 and 1916:

	1916		1915	
	Amount	Per Cent	Amount	Per Cent
Operating revenue:				
Passenger	$7,692,258	99.2	$7,968,094	99.3
Other operating revenue	59,485	0.8	56,000	0.7
Total	$7,751,743	100.0	$8,024,094	100.0
Operating expenses and taxes:				
Maintenance of way and structures	$550,046	7.1	$633,943	7.9
Maintenance of equipment	371,561	4.8	435,826	5.4
Transportation	3,353,488	43.2	3,129,802	39.0
General	630,139	8.1	558,255	7.0
Total operating expenses	$4,905,234	63.2	$4,757,826	59.3
Taxes	508,800	6.6	516,000	6.4
Total operating expenses and taxes	$5,414,034	69.8	$5,273,826	65.7
Operating income	$2,337,709	30.2	$2,750,268	34.3
Other income	178,525	2.3	208,058	2.6
Gross income	$2,516,234	32.5	$2,958,326	36.9
Income charges	515,470	6.7	522,147	6.5
Income before deducting bond interest	$2,000,764	25.8	$2,436,179	30.4
Bond interest	1,604,026	20.7	1,628,652	20.3
Net income	$396,738	5.1	$807,527	10.1

The last fiscal year, it is said, was in point of earnings one of the most unsatisfactory in the history of the company. Through the unregulated competition of the jitneys, which throughout the year were permitted to enjoy a large percentage of the short haul traffic, serious inroads were made into the gross earnings, which it was not possible to recoup by a reduction in operating expenses. The passenger revenues decreased $275,836 or 3.5 per cent, and a small increase in other operating revenues was sufficient only to reduce the loss in gross operating revenues to $272,351 or 3.4 per cent. Operating expenses, however, rose $147,408 or 3.1 per cent, in spite of decreases of $83,897 or 13.2 per cent in maintenance of way and structures and $64,265 or 14.7 per cent in maintenance of equipment, on account of numerically greater increases of $223,686 or 7.1 per cent in transportation expenses and $71,884 or 11.8 per cent in general expenses.

The combined effect of decreased revenues and increased expenses was slightly lessened by a decrease of $7,200 or 1.4 per cent in taxes, but the operating income fell off $412 559 or 15 per cent. Moreover, other income decreased $29,533 or 14.1 per cent, so that the total loss in gross income amounted to $442,092 or 14.9 per cent. Income charges, consisting of rentals, interest on notes, etc., showed a small decrease, as did bond interest, but the net income suffered a loss of $410,789 or 50.8 per cent. After making a profit and loss charge of $550,000 for depreciation and other adjustments, the surplus as of June 30 amounted to $1,270,610. The depreciation reserve at the end of the year showed a balance of $75,507. During the year there was a decrease of $219,109 in the property accounts for sold or scrapped material, and additions and betterments were made to the extent of $180,734.

American Railways, Philadelphia, Pa.—The American Railways has sold to Newberger, Henderson & Loeb and Bioren & Company, Philadelphia, and Scott & Company, Wilmington, Del., $2,475,000 of its 5 per cent thirty-year bonds secured by the deposit as collateral of $1,675,000 first mortgage 5 per cent bonds of the Ohio Valley Electric Company, and $800,000 of 5 per cent bonds of the Consolidated Light & Power Company. These bonds of the controlled companies are guaranteed, principal and interest, by the American Railways. The American Railways has called for payment on Feb. 1, at 100½ and interest, $628,000 of the $2,300,000 of three-year 5 per cent notes issued on Feb. 1, 1916.

Bay State Street Railway, Boston, Mass.—The Bay State Street Railway has been authorized by the Massachusetts Public Service Commission to issue $2,500,000 of coupon notes, bearing interest at 6 per cent, to pay for reconstruction of track equipment and betterments. The notes mature serially $357,000 on Dec. 1, 1917, and each year in like amount up to and including Dec. 1, 1922. On Dec. 1, 1923, the final $358,000 in notes mature.

Boston (Mass.) Elevated Railway.—The special commission investigating the finances of the Boston Elevated Railway gave a final hearing on Nov. 28. On this occasion the various relief measures proposed by the company were attacked, but some of the interests opposing an increase in fares, reduction in transfer privileges or abatement of taxes, favored the purchase of the Cambridge subway by the State or the city of Cambridge, subject to a thorough investigation of the transportation problem of the Boston district.

Cape Electric Tramways, Ltd., Cape Town, South Africa.—The profit and loss account of the Cape Town Electric Tramways, Ltd., on June 30, 1916, showed a profit of £72,497, and after providing for debenture interest and redemption of debentures and taking into account last year's balance, a net credit of £31,404 remained. The traffic receipts during the last year showed a small improvement, but this was more than offset by the higher cost of operation, including increased labor charges and war allowances. During the year the tramways carried 22,477,366 passengers as compared to 21,680,070 in 1915.

Consolidated Cities Light, Power & Traction Company, New York, N. Y.—Klemm & Keen and Brooke, Stokes & Company, Philadelphia, Pa., are offering $3,000,000 of the first lien 5 per cent gold bonds, due July 1, 1962, of the Consolidated Cities Light, Power & Traction Company heretofore owned by the Cities Service Company. In 1912, $7,000,000 of these bonds were sold in England, making the total amount of the issue $10,000,000. The bonds are secured by deposit with the Bankers Trust Company, trustee, of substantially all the common stocks and certain of the bonds of thirteen properties. The Cities Service Company subsequently acquired the equities of the Consolidated Cities Light, Power & Traction Company in these subsidiaries and guaranteed both the principal and interest of the first lien 5 per cent bonds. The bonds are being sold at 92½ to yield about 5½ per cent.

Fresno (Cal.) Interurban Railway.—The California Railroad Commission has authorized the Fresno Interurban Railway to issue $149,700 of first-mortgage 6 per cent twenty-five-year bonds, under its deed of trust to the Mercantile Trust Company, San Francisco. These bonds are to substitute other bonds heretofore authorized under another form of mortgage. The company is also authorized to issue $70,000 of these bonds, and 350 shares of stock of a par value of $35,000. The $70,000 of bonds are to be sold at not less than 80 per cent net, and the stock at the same rate. Both are to be issued so that the par value of the stock issued shall at all times be not less than 50 per cent of the bonds. The proceeds from stock and bonds are to go as follows: $49,597 for extending the company's railway line, $25,000 for a gasoline motor car and $10,000 for rights-of-way. The Fresno Interurban Railway has also been authorized to execute notes for $3,850 and $4 000 to pay deficits in operation of the company's line during construction and cost of materials in connection with the construction. The notes are to be for not more than two years at 8 per cent. The company has heretofore been authorized by the commission to issue 450 shares of stock at a par value of $100 a share, $149,700 of bonds and a note for $10,396. Its main line is 16 miles long.

Indianapolis Traction & Terminal Company, Indianapolis, Ind.—The Indianapolis Traction & Terminal Company has filed a petition with the Indiana Public Service Commission asking for approval of an issue of car trust certificates amounting to $125,000. The company proposes to pay

$33,000 in cash on an order for twenty-five cars already placed, and issue the remainder of the purchase price in car trust certificates.

Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo.—Judge Bird of the Jackson County Court, at Kansas City, Mo., on Nov. 29, discharged Jacques Harvey and I. D. Hook as receivers of the Kansas City, Clay County & St. Joseph Railway and turned the property over to J. R. Harrigan, general manager. This action followed the approval of a new appeal bond of the railway by the Supreme Court of Missouri in the suit against it by the Interstate Railway, which previously obtained a judgment of $1,500,000 against the company. The plaintiff had resisted the approval of the bond for a year. The Supreme Court recently declared that the bond supplied by the National Surety Company for $3,400,000 was insufficient, because the bond represented more than 10 per cent of the Surety Company's capital and surplus. A new bond for the same amount, filed as a result of this decision, had, in addition, the names of six leading bankers of Kansas City and St. Joseph. The appeal of the suit, in which judgment had been entered, will be heard in the April term by the Supreme Court.

Knoxville Railway & Light Company, Knoxville, Tenn.—The Knoxville Railway & Light Company has decided to pay off and discharge all of the consolidated mortgage 5 per cent gold bonds bearing numbers from 1 to 926 inclusive, and from 1751 to 3000 inclusive, on March 1, 1917, at 107½ on each $100, with interest accrued to March 1. The company has also elected to call and redeem all the two-year 6 per cent collateral notes of the company outstanding on Jan. 3, 1917, at 101½ and accrued interest for each $100.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.—Bodell & Company, Providence, R. I., are offering a block of Mahoning & Shenango Railway & Light Company 7 per cent cumulative preferred stock at a price close to par.

Metropolitan Street Railway, New York, N. Y.—Announcement is made of the termination of the agreement entered into under date of Dec. 10, 1907, by the stockholders of the Metropolitan Street Railway for their protection. The committee had a claim pending against the New York City Railway for breach of its guaranty with respect to the payment of dividends at 7 per cent per annum upon the stock of the Metropolitan Street Railway. This claim was finally allowed by the court as a general claim against the assets of the New York City Railway to the extent of $1.75 a share. The New York Railways, the successor to the Metropolitan Street Railway, offered to purchase the claim of the committee for cash at 45 per cent of $1.75 or 78¾ cents per share. Counsel for the committee reported that as other litigation was pending, it was not possible to determine accurately what dividend would ultimately be paid upon general claims, but that in their judgment the dividend would not be more than 45 per cent and might be materially less than that amount. Counsel for the committee also advised that adjustment would probably be subject to considerable further delay and advised that the committee accept the offer of the New York Railways. The chairman of the stockholders protective committee now announces that having exhausted all means of protecting the rights and interests of the participants the agreement entered into to conserve the interests of the stockholders has been terminated. A cash distribution of 85 cents for each share of the stock of the Metropolitan Street Railway deposited under the agreement is to be made in full liquidation of the interests of the holders. John I. Waterbury, chairman of the protective committee, says that the members of the committee will not accept any compensation for their service in the interest of the depositing stockholders.

Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, Minneapolis, Minn.—The Federal Court at Minneapolis has ordered the foreclosure of the mortgage securing an issue of $1,000,000 of first mortgage bonds of the Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company. The issue of $1,000,000 of bonds is pledged as collateral to secure an issue of $750,000 of three-year notes.

Seattle & Rainier Valley Railway, Seattle, Wash.—Frank P. Helsell, chief deputy prosecuting attorney of the State of Washington, has advised Fred J. Carver, attorney, that since the Seattle & Rainier Valley Railway is complying with the statutory provisions regulating such foreign corporations, the State has declined to institute *quo warranto* proceedings to oust the railroad, as requested by Mr. Carver. Mr. Helsell claims the lawyer was acting as creditor of the old Seattle, Renton & Southern Railway. Attorney Carver urged four grounds for bringing the proceedings: (1) That the new company was organized under the general corporation laws of Delaware, and by virtue of those laws was not permitted to do a street railway business within that State; (2) that the new company has issued bonds in excess of double the amount of the paid-up stock in violation of the Washington law; (3) that under the Delaware law, there is the same bond limitation; (4) that the bonds of the company were issued to an amount in excess of the assets received in exchange for them. Prosecutor Helsell states that in Delaware special incorporation laws govern companies doing a street railway business in that State, and that the fact that the Seattle & Rainier Valley Railway was incorporated under the general law does not, under the Washington statutes, exclude it from doing business in Washington. Helsell also asserted that the bond law, given as the second ground, had been repealed, and that even if a similar one existed in Delaware, it was not applicable to the local corporation. Replying to the fourth reason, Helsell said that the State was in possession of no facts that would justify an allegation that the amount of the company's bonds exceeded the assets received in exchange for the bonds.

Springfield Terminal Railway & Power Company, Springfield, Ohio.—The Springfield Terminal Railway & Power Company has been organized to succeed the Springfield, Troy & Piqua Railway. The management remains unchanged, except that F. J. Green, who has been vice-president and general manager, succeeds to the presidency. The company has authorized an issue of $350,000 of first mortgage 6 per cent serial gold bonds of 1916. These bonds will be used to fund floating indebtedness and constitute the new company's only indebtedness. Of the $350,000 of bonds $250,000, the portion outstanding, is now being offered for subscription by C. W. Anderson & Company, Chicago, at 101 and interest. The remaining bonds can be issued only for betterments and additions to the extent of 85 per cent of their cost.

Standard Gas & Electric Company, Chicago, Ill.—The directors of Standard Gas & Electric Company have declared a dividend of 1.5 per cent on the preferred stock for the quarter ending Nov. 30, payable on Dec. 15, to stockholders of record of Nov. 29. This is an increase of one-half of 1 per cent over the quarterly dividends recently paid.

Third Avenue Railway, New York, N. Y.—E. A. Manice has been elected a director of the Third Avenue Railway to succeed George W. Davison.

United Light & Railways Company, Grand Rapids, Mich.—William P. Bonbright & Company, New York, N. Y., are offering for subscription at 99 and accrued interest $1,500,000 of 6 per cent convertible gold debentures of the United Light & Railways Company dated Nov. 1, 1916, and due Nov. 1, 1926. The debentures are convertible at the option of the holder upon ten days' notice from Nov. 1, 1918, to Nov. 1, 1923, into 6 per cent preferred stock at the rate of $1,125 par value for each $1,000 par value debenture. The issue is callable in whole or in part upon thirty days' notice any time prior to Nov. 1, 1921, at 102 and interest and thereafter at 101 and interest. The debentures are in the denomination of $100, $500 and $1,000 registerable as to principal in all these denominations, but fully registerable only in the $1,000 denomination. The New York Transit Company is trustee of the issue.

Washington Water Power Company, Spokane, Wash.—The Farmers' Loan & Trust Company, New York, N. Y., trustee under the indenture securing the first and refunding mortgage 5 per cent bonds of the Washington Water Power Company, dated 1909 and due in 1939, has $33,880 to invest for the quarterly purchase of bonds for the sinking fund, and is advertising for proposals until Dec. 15.

DIVIDENDS DECLARED

Arkansas Valley Railway, Light & Power Company, Pueblo, Col., quarterly, 1¾ per cent preferred.

Brooklyn (N. Y.) Rapid Transit Company, quarterly, 1½ per cent.

Frankford & Southwark Passenger Railway, Philadelphia, Pa., quarterly, $4.50.

Indianapolis (Ind.) Street Railway, 3 per cent.

Iowa Railway & Light Company, Cedar Rapids, Iowa, quarterly, 1¾ per cent; quarterly, 1¾ per cent, preferred.

Second & Third Streets Passenger Railway, Philadelphia, Pa., quarterly, $3.

United Railways & Electric Company, Baltimore, Md., 2 per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
ATLANTIC SHORE LINE RAILWAY, SANFORD, ME.					
1m., Oct., '16	$25,367	*$24,841	$526	......	......
1 " " '15	24,486	*24,452	34	......	......
BERKSHIRE STREET RAILWAY, PITTSFIELD, MASS.					
1m., Oct., '16	$84,964	*$72,994	$11,970	$27,675	†‡$15,526
1 " " '15	81,178	*67,879	13,299	16,845	†‡3,382
4 " " '16	374,050	*296,935	77,115	110,906	†‡33,065
4 " " '15	352,785	*259,633	93,152	67,740	‡26,015
COLUMBUS RAILWAY, POWER & LIGHT COMPANY COLUMBUS, OHIO					
1m., Oct., '16	$307,437	*$187,470	$119,967	$42,863	$77,104
1 " " '15	272,152	*155,914	116,238	40,189	76,049
12 " " '16	3,461,301	*2,039,510	1,421,791	512,332	909,459
12 " " '15	3,076,070	*1,828,835	1,247,235	473,115	774,120
COMMONWEALTH POWER, RAILWAY & LIGHT COMPANY, GRAND RAPIDS, MICH.					
1m., Oct., '16	$1,458,380	*$807,437	$650,943	$419,085	$231,858
1 " " '15	1,245,866	*650,441	595,425	373,097	222,328
12 " " '16	16,518,224	*8,878,592	7,639,632	4,998,342	2,641,290
12 " " '15	14,173,088	*7,532,353	6,640,735	4,385,885	2,254,850
CONNECTICUT COMPANY, NEW HAVEN, CONN.					
1m., Oct., '16	$812,160	*$682,222	$129,938	$96,174	‡$56,896
1 " " '15	711,184	*508,782	202,402	98,014	‡127,637
4 " " '16	3,502 968	*2,578,596	924,372	391,402	‡653,585
4 " " '15	3,067,969	*2,008,869	1,059,100	392,438	‡759,458
EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS. ILL.					
1m., Oct., '16	$271,636	*$160,412	$111,224	$63.665	$47,559
1 " " '15	222,456	*125,272	97,184	63,051	34,133
12 " " '16	2,911,182	*1,736,727	1,174,455	753,533	420,922
12 " " '15	2,430,418	*1,436,389	994,029	760,804	233,225
GRAND RAPIDS (MICH.) RAILWAY					
1m., Oct., '16	$103,659	*$70,579	$33,080	$15,995	$17,085
1 " " '15	97,125	*71,592	25,533	14,061	11,472
12 " " '16	1,286,511	*838,788	447,723	178,555	269,168
12 " " '15	1,189,541	*826,024	363,517	164,353	199,164
LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY, LEWISTON, ME.					
1m., Oct., '16	$72,302	*$49,895	$22,407	$15,166	$7,241
1 " " '15	63,932	*40,069	23,863	15,951	7,912
12 " " '16	793,677	*536,681	256,996	189,025	67,971
12 " " '15	722,203	*469,777	252,426	189,242	63,184
NASHVILLE RAILWAY & LIGHT COMPANY, NASHVILLE, TENN.					
1m., Oct., '16	$205,999	*$127,095	$78,904	$41,474	$37,430
1 " " '15	189,636	*121,088	68,548	43,141	25,407
12 " " '16	2,355,769	*1,442,952	912,817	510,379	402,438
12 " " '15	2,135,656	*1,299,749	835,907	497,717	338,190
NEW YORK, WESTCHESTER & BOSTON RAILWAY, NEW YORK, N. Y.					
1m., Oct., '16	$60,133	*$48,738	$11,395	§$5,943	‡$6,710
1 " " '15	45,190	*40,898	4,292	§4,495	‡1,129
4 " " '16	206,894	*184,312	22,582	§25,795	‡1,013
4 " " '15	170.076	*166,354	3,722	§25,038	†‡14,412
PHILADELPHIA (PA.) RAPID TRANSIT COMPANY					
1m., Oct., '16	$2,417,096	$1,380,594	$1,086,502	$814,450	$272,052
1 " " '15	2,219,105	1,232,080	987,025	816,615	170,410
4 " " '16	9,007,921	4,986,327	4,021.594	3,259,138	762,456
4 " " '15	8,066,753	4,530,010	3,536,743	3,264,763	271,960
RHODE ISLAND COMPANY, PROVIDENCE, R. I.					
1m., Oct., '16	$478,522	*$363,881	$114,641	$120,714	‡$21,388
1 " " '15	439,590	*342,111	97,479	120,284	‡4,630
4 " " '16	2,151,092	*1,468,416	682,676	482,832	‡232,127
4 " " '15	1,898,150	*1,363,844	534,306	481,673	‡84,313
WESTCHESTER STREET RAILROAD, WHITE PLAINS, N. Y.					
1m., Oct., '16	$15,799	*$17,483	†$1,684	$1,893	†‡$3,554
1 " " '15	22,249	*21,720	529	1,606	†‡1,049
4 " " '16	78,373	*81,561	†3,188	7,436	†‡10,519
4 " " '15	96,381	*87,792	8,589	6,393	‡2,315

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*Includes taxes. †Deficit. ‡Includes non-operating income. §Excludes interest on bonds, charged income and paid by the New York, New Haven & Hartford Railroad under guarantee, also interest on notes held by the New York, New Haven & Hartford Railroad, not credited to income of that company.

Traffic and Transportation

CROSSING SAFETY CONSIDERED

Commission, Electric Railway and Automobile Representatives Confer at Rochester, N. Y., on Safety Measures

On Nov. 28 the Public Service Commission for the Second District of New York met at the Powers Hotel, Rochester, with the executive and sub-committees appointed some time ago from among representatives of automobile clubs and electric railway officials to consider greater safety at grade crossings of electric railways and highways. Among the outstanding conclusions arrived at during the conference were the following:

Obstructions which prevent the observance of an approach of an electric train at grade crossings should be removed or diminished.

Character of crossings should determine whether obstructions should be removed or diminished.

Obstructions on railroad property should be removed at the expense of the railroads.

Obstructions on public highways should be removed at the expense of the public authorities.

Obstructions upon private property should be removed upon recommendation of the joint committee, and if they cannot agree the Public Service Commission shall decide.

Data should be acquired on the character of grade crossings for 1000 ft. along the tracks and 200 ft. along the highway at all crossings.

Automobile horns should be standardized.

Devices on trolley cars and automobiles for signaling are as effective as the present condition of the art of signaling affords.

Trolley car whistles and automobile horns should have distinct sounds.

Trolley car motormen should be required to sound their whistles beginning 1000 ft. from a grade crossing, and keeping it up until the head car is not less than 300 ft. from the crossing.

Headlights should be used at night, if possible in conjunction with a reflecting device, at grade crossings.

Uniform signaling devices for automobiles and trolley cars should be adopted.

A large stationary distance marker should be adopted. It should read: "Railroad Crossing 500 ft. Ahead," and the Public Service Commission should use arrows on the signs in its discretion.

Fifteen miles an hour should be adopted as a maximum speed at which an automobile should cross a grade crossing.

One of the most discussed proposals was that for establishing a 15 m.p.h. minimum for autoists crossing tracks at grade. At the morning session Charles R. Barnes, electric railway inspector for the Public Service Commission, made a report in which he said that after all contrivances for safety have been used the personal equation still was a factor that was of primary importance.

It is possible that the commission may ask the Legislature for additional power to meet the recommendations adopted as the result of the study carried on by the committees and by the commission. At present the commission has power to order the elimination of steam railroad grade crossings, and can make certain regulations for the operation of trains for greater safety at grade crossings, but aside from actual elimination the commission has no power over surrounding highway conditions to enforce greater safety at grade crossings. While the commission has power to make regulations for the operation of electric cars and trains at grade crossings, it has no control over other surrounding highway conditions. In the case of electric railways there is no provision of law for the elimination of grade crossings, and it is not likely that such provision could be made at this time. If, as seems likely, the commission asks for the power to control the surroundings of steam railroad grade crossings, members of the committtees with which the commission has been working have advocated the same power for electric railways.

PORTLAND JITNEYS DIE HARD

Operators Take Advantage of Technicality in Law to Operate at Regular "For Hire" Prices

The action of the City Council of Portland, Ore., in requiring jitneys in that city to operate under franchise has resulted in jitney drivers running their cars as taxicabs through a technicality in the "for-hire" license ordinance. Under this plan the jitneys operate anywhere in the city at regular "for-hire" prices, but specialize in service over certain streets for a 5-cent fare. Where there were routes before the jitney franchise ordinance went into effect there are zones now. The zones have been printed in black and white and posted in every machine. There are concentration points in the lower business districts, and from these points cars are dispatched to the different zones by men in charge of the work.

City Attorney La Roche, in his interpretation of the ordinance under which the former jitneys are operating, stated that machines operating under this ordinance were not compelled to have a fixed standing place, and that the maximum fare charged for any certain zone and for the hour must be filed with the Department of Public Utilities, as well as posted inside and out of the car. In releasing two taxi-jitney drivers in the Municipal Court recently who were charged with having operated without a franchise and without having had their speedometers inspected Judge Langguth of the Municipal Court said:

"Operation of the machines under the present law may be an evasion on the part of the drivers, but this court cannot read anything into the law. I want to warn the members of the Chauffeurs' Union that if they intend to operate under this law they must comply with it in every term. I am not going to show favors on either side, and it will be for the drivers to carry out their part of the contract."

An appeal from the action of Commissioner Daly of the Department of Public Utilities in approving the "zone system" of the taxi-jits and issuing certificates for licenses for the operation of the machines has been filed with the City Council. The appeal is based on the ground that the schedule of zones and rates for service are not clear or distinct or easily understood; that the uniform method of fixing rates has not been followed; that a uniform zone system has not been established and that the schedule of rates is not made according to time consumed in serving a zone or the distance traveled as required in the taxicab and "for-hire" ordinance. The petitioners ask that all the actions of Commissioner Daly in approving the applications and issuing certificates for the issuance of licenses for the operation of the taxi-jits be rescinded by the Council. It is asserted that only the individuals residing within one of the zones served by the machines have advantage of a 5-cent fare, while all other residents of the city have to pay for the hire of such machines on an hourly basis, which is claimed to be discriminatory and unfair.

R. A. Leiter, counsel for the Portland Railway, Light & Power Company, appeared before the Council in behalf of the petitioners with the statement that the appeal had been filed in accordance with a provision of the taxicab ordinance which permits an applicant who has been denied a license for the operation of a machine by the Department of Public Utilities to appeal to the City Council.

Commissioner Daly said that he had not had sufficient time in which to go into the petition, and asked that the matter be postponed for a week, at which time he will make a report on the application. He also stated that his report covering the granting of reasonable franchises to jitneys will be ready for the consideration of the Council at an early date.

With the recent decision of Municipal Judge Langguth that the taxi-jits have a right to operate under the taxicab and "for-hire" ordinance, providing they comply with all the regulations, further molestation of the operation of the machines will be deferred until additional legislation is enacted by the Council. Unofficial reports place the number of taxi-jits in operation at 200.

The various applications for franchises to operate jitneys in Portland were to be considered by the Council on Dec. 7, when Commissioner Daly planned to have the proposed zone system for taxicabs ready for presentation to the Council.

ANOTHER JITNEY DECISION IN PENNSYLVANIA

Certificates to Jitneys Will Be Granted Only When Owners Demonstrate They Can Furnish Satisfactory Service

Jitneys are common carriers within the meaning of the Pennsylvania Public Service law and can only be operated when their owners have obtained certificates of public convenience from the Public Service Commission, which will grant authority to operate only when applicants for certificates show that they have safe and adequate vehicles. This in substance is the ruling of the commission in a decision rendered on Dec. 6. The opinion was written by Chairman Ainey and refuses a certificate to Peter Graco, against whose operation of a jitney the Allegheny Valley Street Railway had filed a protest.

The opinion is the first in which the commission has taken a stand against jitneys not of sufficient size to meet demands of traffic. It lays down rules, and under the decision will come probably a score or more of jitney operators in western Pennsylvania who have been complained against, while the case will furnish a precedent in other cases which may be brought. The opinion says:

"It is clearly apparent from the evidence that their automobiles were frequently and dangerously overloaded; some times as many as sixteen passengers were permitted to ride in automobiles with seating capacity for four or five persons. Passengers were at times seated on the doors or mudguard of the cars or permitted to stand on the running board, and others were crowded within the automobile. Not infrequently passengers were permitted to be crowded beside the driver in the space calculated for but one passenger."

It is also pointed out that the street railway lost money through this unrestricted competition, and after quoting numerous decisions the opinion says:

"The conclusion is irresistible that the professions and the conduct of the said respondent and all the circumstances involved in the jitney business in which he is engaged, constitute him a common carrier of passengers. . . . We may not properly permit individuals to engage in public service unless the safety of the public is reasonably assured and until we have determined that the proposed service is necessary or proper for the convenience, accommodation or safety of the public. . . . Even though we were convinced as we are not that the street railway is not furnishing adequate service and that automobile transportation is necessary for the convenience of the public, this applicant has failed to show that the five passenger automobile is of sufficient size or of proper form of construction to meet any public demand for transportation convenience. If there be any necessity whatever in this locality it is surely one requiring a larger automobile and better arrangements for public service than the one he offers. This and the allied cases must be disposed of on the broad ground of public necessity."

In an opinion by Chairman Ainey of the commission on Dec. 7, in the case of the Wilkes-Barre Railway against Walter J. Parsons for operating a jitney bus from Wilkes-Barre to points beyond the limits of the city, the Public Service Commission holds that the act of 1915 giving cities the right to regulate the operation of motor vehicles in no wise restricts the Public Service Company law with reference to the requirement as to the issuance of certificates of public convenience, preceding the beginning of the exercise of the rights to operate automobiles as common carriers. The commission orders that the respondent, Walter J. Parsons, his agents, servants and employees cease from carrying on the public service mentioned until he shall have obtained a certificate of public convenience.

ILLINOIS TRACTION WINS FARE CASE

The Interstate Commerce Commission on Dec. 4 approved an increase by the Illinois Traction Company, Peoria, Ill., of the fare between St. Louis, Mo., and Venice, Madison and Granite City, Ill., from 5 to 10 cents. This action nullifies a provision of the franchise under which the St. Louis Electric Terminal Railway, the local end of the Illinois Traction System at St. Louis, obtained the use of St. Louis streets. The franchise bill, signed on April 6, 1907, provided that the fare to be charged from St. Louis to Granite City, across the McKinley Bridge, should be 5 cents. This was accepted by the company, and the 5-cent fare has been charged since the bridge was opened to traffic in November, 1910. The unofficial report of the finding of the commission says that the commission held that the St. Louis Electric Terminal Railway is a common carrier, and as such is subject to the commission's jurisdiction. It was also held by the commission that interstate fares, when prescribed by a municipal ordinance, are not conclusively presumed to be reasonable, even if accepted by the carrier as one of the conditions of a franchise. The proposed issuance of commutation tickets, valid only during certain rush hours, was tentatively approved. The main argument before the commission in the case was summarized in the ELECTRIC RAILWAY JOURNAL of Nov. 4, page 995.

Accident Talks in New Albany Schools.—Mrs. Minnie Riddle of the safety department of the Louisville & Southern Indiana Traction Company, New Albany, Ind., and allied lines, is delivering talks on accident prevention in the public schools of New Albany. Mrs. Riddle recently completed a campaign of education in the public schools of Chicago.

New York Subway Record Broken.—All records for subway traffic in New York were broken on Nov. 20, when 1,400,747 passengers were carried on the various branches of the underground system of the Interborough Rapid Transit Company between 12.01 a. m. and 11.59 p. m. The capacity of the subway as designed originally was 600,000 passengers daily.

Employees Requested to Take Their Paper Home.—At the top of the cover of the United Railways Bulletin for November, published monthly for distribution among the employees of the United Railways, St. Louis, Mo., was stamped the following: "Take the Bulletin home. There are things in the paper which will be interesting to your wife and children."

Detroit Rerouting Grants Allowed.—The Common Council of Detroit, Mich., has adopted the report of the joint committees on public utilities and traffic and police regulations to the end that rerouting of cars within the heart of the city may be accomplished. By the adoption of the report and the accompanying resolution the Detroit United Railway is authorized to construct several curves and other pieces of special track work, as well as some straight track, all necessary to move the cars and loop them differently than is possible by the existing tracks. The company intends to proceed with all possible speed to install the tracks.

Near-Side Stops and Prepayment Operation in Walla Walla.—On Nov. 20 the Pacific Power & Light Company, operating the railway system in Walla Walla, Wash., through the Walla Walla Valley Railway, began the operation of the near-side stop, with the prepayment method of fare collection. While the near-side stop will be general in its application, it will not prevail under all conditions. The company explained these exceptions to its patrons in advance. Fares are taken as passengers enter cars, except at terminals, where passengers are permitted to enter cars while the carmen are preparing for the return trip. The changes were brought to the attention of patrons by printed leaflets distributed in the cars. The company closed its notice to its patrons with a number of maxims, such as: "Safety First," "Alight Facing Forward," "Wait Until Car Stops," "Safety Always."

Extension in Burlington County Fare Case.—The case of the Burlington County Transit Company, Hainesport, N. J., charged with increasing fares on its line between Burlington and Moorestown and Mount Holly without having made improvements which were ordered by the State Public Utility Commission, was before the commission recently. The company received a certain time to show that it had made the improvements promised. The company's representative convinced the commission that the delay in securing new cars and getting material for repairs was due to trade conditions, and was not the result of any negligence on the part of the company. The promise was made that these improvements would be made at an early date, and in accepting this statement the commission granted another extension to Jan. 9, at which time, if the company has not made the alterations, the increase of fare will be automatically prohibited.

Company to Operate Under Long Beach Jitney Franchise.—The Long Beach Transportation Company, a corporation with a capital stock of $50,000, has been formed by the individuals who recently purchased a ten-year jitney franchise at Long Beach, Cal. The purchase price was $6,600, and 3 per cent of the gross receipts are to be paid each year to the city during the ten-year period. Fifteen buses, built in the Ford shops at Long Beach at an approximate cost of $10,050, will be put in service about Dec. 15. Two routes will be covered, each extending about 2½ miles from the down-town terminus, and transfers will be issued between the two lines. The maximum fare will be 5 cents, with half-fare rates for public school children and free transportation to officials and postmen. A ten-minute service will be in operation from 6 a. m. to 7 a. m., a five-minute service from 7 a. m. to 8 p. m., and a ten-minute service from 8 p. m. until midnight. R. S. Julian has been elected president and general manager of the corporation, with F. H. Church as secretary and assistant general manager.

Company Writing Jitney Insurance Disbarred.—The jitney business in Seattle, Wash., and other large cities in the State has been imperiled by a ruling of State Insurance Commissioner Fishback, who announces that the Casualty Company of America, practically the only company issuing the $2,000 bond for jitneys required by the State, has been debarred from writing insurance in Washington. The Casualty Company of America, which recently absorbed the Pacific Coast Casualty Company, has furnished nine-tenths of the jitney operators with their bonds. Other companies have bonded a few of the motorbus men, but the jitney drivers have found it difficult to obtain bonds anywhere except from this company. The Casualty Company of America's stock is said to be impaired to the amount of $650,000, and until its affairs are in a condition satisfactory to the State Insurance Commissioner, it will not be allowed to do business in the State. The company was allowed until Dec. 4 to adjust its finances. The insurance rate on the $2,000 jitney bonds was raised recently from $175 to $250.

School Children's Fares Discriminatory.—The Railroad Commission of California has rendered its opinion on the application of certain citizens for an order requiring the San Francisco-Oakland Terminal Railways, Oakland, to grant a rate of one-half the regular fare of 5 cents for children attending the public schools, and has reached the following conclusion: "A class of persons cannot be given a special rate when the only distinguishing characteristic of the class is the purpose for which the people in the class are traveling. The service performed by carriers in transporting children attending public schools is the same as that in transporting other children and other persons, the only distinguishing characteristic, as shown by the pleadings and evidence herein, is the purpose for which these children are being transported. This distinguishing characteristic cannot warrant the commission in making a special rate in such cases." On Nov. 16 the applicants for the special rate for school children petitioned the Railroad Commission for a rehearing. This application was denied by the commission the following day.

Commission Transfer Order Set Aside.—An order of the Board of Public Utility Commissioners of New Jersey, made at the request of Bradley Beach, after a hearing directing the Atlantic Coast Electric Railway to issue transfers to its patrons in Asbury Park and Bradley Beach, was set aside on Dec. 1 by the Supreme Court of New Jersey in an opinion handed down by Justice Trenchard. The company operates an electric railway from the junction of Main Street and Cookman Avenue, Asbury Park, southerly through other municipalities and Bradley Beach to Belmar. In the syllabus of his opinion for the court Justice Trenchard said: "When a traction company organized under the general traction act of 1893 obtains from a municipality an ordinance granting a location of street railway tracks, and accepts the same, a regulation of rates of fares contained therein, if lawful and reasonable, constitutes a contract between the company and the municipality which, during the life of the franchise, remains inviolable, and it is incompetent for the Board of Public Utility Commissioners to impose upon the company an additional burden in violation of such contract respecting fares."

Personal Mention

John Harvey, an inspector of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, has been promoted to a new assistant superintendency with the company.

C. F. Franklin has resigned as superintendent and purchasing agent of the Winona Interurban Railway, Warsaw, Ind., effective on Jan. 1. No successor to Mr. Franklin has been named.

W. D. Frazer, who retires as general manager of the Winona Interurban Railway, Warsaw, Ind., on Feb. 1 will continue to serve as vice-president of the company and will act as counsel for the receiver.

W. J. Fillmore has been appointed acting superintendent of the Elgin & Belvidere Electric Company, Marengo, Ill., during the absence of L. H. Moss, who is spending a number of months in the East.

J. C. Schade, who has been assistant secretary and assistant treasurer of the Winona Interurban Railway, Warsaw, Ind., has been named general manager under C. J. Munton, the receiver. He will assume his duties on Feb. 1.

Fred J. Green, who has been vice-president and general manager of the Springfield, Troy & Piqua Railway, Springfield, Ohio, has been elected president of the Springfield Terminal Railway & Power Company, organized as the successor company, as noted elsewhere in this issue.

J. W. Osborn, for five years master mechanic of the Chicago & Milwaukee Electric Railroad, Highwood, Ill., now the Chicago, North Shore & Milwaukee Railroad, has resigned. Previous to his service as master mechanic he was assistant electrical engineer on the same property for five years.

Joseph F. Collins, chief inspector of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, has been promoted to the position of division superintendent of a new division of the company, to be known as the Mahoning Valley division, comprising the main line from New Castle to Warren, the lines to Mineral Ridge and Leavittsburg and the Warren City line.

Trevor C. Neilson, assistant claim adjuster of the Columbus Railway, Power & Light Company, Columbus, Ohio, has been appointed claim agent of the East St. Louis & Suburban Railway and related properties, with headquarters at East St. Louis, Ill. Prior to his acceptance of the position of assistant claim adjuster of the Columbus Railway, Power & Light Company in 1914, Mr. Neilson was in the service of the operating and claims department of the United Railroads, San Francisco, Cal., for six years. Mr. Neilson was born abroad and is an attorney by profession.

W. M. Acworth, the well-known English economist and railroad expert, is expected to arrive in Canada about Dec. 15 to sit as the English member of the commission appointed by the Dominion Government to inquire into the railway situation in Canada. Mr. Acworth has visited the North American continent several times and represented the British Government at the International Railway Congress at Washington, D. C., in 1905. While he was in Washington at that time Mr. Acworth gave evidence on English railway law and practice before the Elkins committee of the United States Senate. He also appeared before the Hadley commission on railway operation in 1911. He is a director of the London Underground Railway and London United Tramways.

Edwin K. Morse has been named as transit commissioner of Pittsburgh, Pa., by Mayor Joseph G. Armstrong, as noted briefly in the ELECTRIC RAILWAY JOURNAL of Nov. 25, page 1126. Mr. Morse has studied the subject of transportation in Pittsburgh for about eight years. He has been connected as consulting engineer with the Pittsburgh Subway Company, which has been unsuccessful in obtaining an ordinance for the construction of a subway in the city with private money and private ownership. He was associated for twelve years with the Jones & Laughlin Steel Company as consulting engineer in the reconstruction of the Eliza furnaces and its rolling mills. He designed and superintended the foundations for all the hot metal bridges for the Carnegie Steel Company and that company's railroad bridge across the Allegheny River on the road to the lakes. He has in the past been connected as consulting engineer with the city of Pittsburgh. The object of Mr. Morse's study as transit commissioner will be to devise ways and means of relieving the abnormal congestion in the downtown business section of the city of Pittsburgh, where owing to the Allegheny and Monongahela Rivers on two sides and the so-called "hump" on the third side of the small triangle representing less than 225 acres of ground, is one of the most congested business sections in the world, and one that can never be changed geographically or topographically. Mr. Morse will also take up and study the question of relief by subway and report to the Mayor and the Council within one year from Nov. 6, the time of his appointment.

James D. Callery has resigned the presidency of the Pittsburgh (Pa.) Railways. He will continue to serve the company as chairman of the board of directors. The vacancy caused by the resignation of Mr. Callery will be filled by Sumner L. Tone, now vice-president of the Duquesne Light Company, one of the subsidiaries of the Philadelphia company, of which the Pittsburgh Railways also is a part. Mr. Callery's resignation will go into effect on Jan. 1, 1917. He has just purchased a seat on the New York Stock Exchange, and will associate himself with N. K. McMullin in the brokerage business. Mr. Callery was born in Pittsburgh on Nov. 11, 1857. He began his business career with his father in the leather manufacturing business. Mr. Callery's father, the late James Callery, founded the Pittsburgh & Western Railroad and was interested in the first horse-car line established in Pittsburgh. In 1889, when president of the Second Avenue railway in Pittsburgh, James D. Callery decided upon a change in motive power of the railway to electricity, and the Second Avenue line was the first in Pittsburgh proper to be operated successfully by that power. In 1902 Mr. Callery was elected president of the consolidated street railways of Pittsburgh, known as the Pittsburgh Railways. Mr. Callery is a vice-president of the Philadelphia Company and of its subsidiary companies, is president of the United Traction, the Southern Traction Company, the Allegheny Light Company, the Pittsburgh Railways and subsidiary companies, and vice-president of the Consolidated Gas Company, Pittsburgh. In addition to these offices he is a director of the Colonial Trust Company and the Diamond National Bank, Pittsburgh, the Westinghouse Electric & Manufacturing Company, the Westinghouse Machine Company, and the United Railways Investment Company.

OBITUARY

James Phair, superintendent and master mechanic of the Manitowoc & Northern Traction Company, Manitowac, Wis., since the line was built twelve years ago, died on Nov. 17. He had been ill for more than two years.

Millard F. Thompson, Carlisle, Pa., died on Dec. 1 from a stroke sustained some weeks ago. He was sixty-seven years old. Mr. Thompson was interested in railway work throughout Pennsylvania and was secretary-treasurer of the Carbondale Traction Company from 1892 to 1896. He was also secretary-treasurer of the Jeannette & Pittsburgh Street Railway and the Greensburg & Mt. Pleasant Railway and president of the Pennsylvania & Western Railroad.

Josiah Quincy Bennett, who was identified with the supply of power to the first electric railway service operated in Massachusetts, by the West End Street Railway, in Cambridge, Mass., died at his residence in that city Nov. 29, at the age of sixty-two. He was president of the Cambridge Electric Light Company, of the Weymouth Light & Power Company, Athol Gas & Electric Company, and other utilities in the central station field, and was a director in various industrial organizations. He is survived by his widow, three sons, and one daughter, who is the wife of Ralph M. Sparks, general passenger agent of the Bay State Street Railway.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

FRANCHISES

New York, N. Y.—In a report by the Bureau of Franchises, upon the application of the Union Railway Company for permission to construct, maintain and operate an extension from a connection with the existing tracks of the company in West 207th Street or Emerson Street southerly along Vermilyea Avenue to Dyckman Street and westerly along Dyckman Street to Hudson River, Harry P. Nichols, Chief of the Bureau, recommends that the petition of the company be denied but that the company be informed that the Board of Estimate and Apportionment will favorably consider a petition for an extension on Amsterdam and Nagles Avenues and Dyckman Street from 207th Street to the Dyckman Street Ferry, provided the company will stipulate to accept a contract providing for the use of the overhead system of electricity on Dyckman Street during the first five years of the grant and at the end of such term to substitute therefor the underground system.

Columbus, Ohio.—The Columbus Railway, Power & Light Company has received a franchise from the Council to construct and operate a double-track line on East Eleventh Avenue, from Fourth Street to Field Avenue, opposite the east entrance to the State Fair Ground. By the terms of the franchise the company is to pay one-half the city's portion of the cost of the Eleventh Avenue subway under which the track will run. This will be approximately $20,000. The new line will complete a loop connecting the Cleveland Avenue and Fourth Street lines.

Pemberville, Ohio.—The Toledo, Fostoria & Findlay Railway has received a franchise from the City Council to maintain and operate the line formerly operated by the Lake Erie, Bowling Green & Napoleon Railway on Front Street, from the westerly boundary line of the village of Pemberville to a point on Bierly Avenue where the line connects with the Toledo, Fostoria & Findlay Railway.

San Angelo, Tex.—The franchise recently granted by the City Council to the Interstate Electric Corporation of New York for operating a street railway system in San Angelo has been confirmed by the voters.

Vancouver, Wash.—The City Council of Vancouver has refused to grant the Portland Railway, Light & Power Company a franchise on First Street to enable it to make a loop about its property and return onto the Interstate Bridge.

TRACK AND ROADWAY

Calgary (Alta.) Municipal Railway.—The city of Calgary has purchased 30 tons of 80-lb. rail from the city of Lethbridge for the construction of ½ mile of single track to connect with the north section of the city over the new Center Street bridge. The opening of this route will save a mile ride between the two outside sections of the city as compared with the present route via West Calgary.

Pacific Electric Railway, Los Angeles, Cal.—Elevation of the Monrovia line of the Pacific Electric Railway from a point between the Selig Zoo and the bridge over Mission Road, to clear the streets at Rose Hill, was ordered in a communication recently approved by the Board of Public Utilities for transmission to the Los Angeles City Council. The streets over which the company will be required to elevate its tracks, if the order is approved by the Council, are Mission Road, Turquoise, Tourmaline, Topaz and Ruby, about 1 mile.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—This company has completed the construction of an extension from Stow to Diablo, 1.36 miles.

Castro Point Railway & Terminal Company, Richmond, Cal.—The Castro Point Railway & Terminal Company has filed with the Railroad Commission of California an application for authority to issue $89,000 of its capital stock, $45,153 to discharge obligations, and the remainder to continue the construction of its line and facilities. The commission last June authorized the issue of these shares when the company should prove to the commission that it had completed a substantial unit of its proposed line. The application says that the company has built a line of single track 1500 ft. in length connecting the San Francisco-Oakland Terminal Railways in Richmond to a wharf which the company has leased to Charles Van Damme. This track permits the street cars of the railway to run to and on the wharf, connecting with the ferry service maintained by the Richmond and Point San Quentin in Marin County. The company states that the cost of construction of its lines to Nov. 1, 1916, was $64,569.

Tidewater Southern Company, Stockton, Cal.—This company has filed a new application with the Railroad Commission of California for authority to construct an extension from Hatch to Irwin City. Engineer Lindsay of the Tidewater Southern Company states, regarding the matter of the road withdrawing its application for the extension and immediately filing a new one, that the action was taken for the purpose of correcting some technical omissions. The extension of the road to Irwin City will be carried out according to original plans. Under date of Nov. 9, Byron A. Bearce, president of the company, in a letter to A. G. Chatham of Turlock, stated that work on the extension from Hatch to Irwin City would begin within a week after the right-of-way has been secured. There are two applications pending before the Railroad Commission. One asks permission to take up the tracks on Sharp's Lane, and the other applies for the right to dispose of 600 shares of stock. If the petitions are granted, the road will issue $600,000 in stock for the purpose of electrifying the road from Modesto to Turlock, and to build the extension to Irwin City, and for the purchase of two passenger coaches and two additional freight motors. Mr. Bearce also states that the stock is now practically sold, and the money is in San Francisco, awaiting the action of the commission on the application.

Shelbyville & Frankfort Realty Company, Shelbyville, Ky.—C. E. Coon, president of the C. E. Coon Company, McConnellsville, Pa., has just completed an inspection of the proposed rights-of-way between Frankfort and Shelbyville over which it is proposed to construct an electric railway to connect with the Louisville Interurban Railway and the Kentucky Traction Company lines. The promoters have agreed to provide Mr. Coon with the rights-of-way and the survey, provided he will build and equip the line and put it into operation. [June 10, 1916.]

Winnipeg (Man.) Electric Railway.—It is reported that the Winnipeg Electric Railway plans to construct a direct electric line to Transcona.

Norwood, Canton & Sharon Street Railway, Canton, Mass.—The Selectmen of Norwood have granted a petition of the Norwood, Canton & Sharon Street Railway, the Norwood Electric Light Department and the New England Telephone & Telegraph Company for the right to construct a new pole line to be used jointly by these companies in Norwood.

Manchester Traction & Light Company, Manchester, N. H.—Steps have been taken by the Manchester Traction & Light Company for the construction of a new dam at Gregg's Falls, 20 ft. below the old dam.

New York Municipal Railway, Brooklyn, N. Y.—The Public Service Commission for the First District of New York has received bids for the construction of the connecting link between the New Utrecht Avenue (West End) line and the Culver line, in Brooklyn. The connection is to be a three-track approach from the West End line to the Culver line, about 600 ft. long, rising from the Thirty-eighth Street cut at the point where the West End line leaves that cut, slightly west of Tenth Avenue and south of Thirty-seventh Street. The approach, curving to the northeast across Tenth Avenue, rises to the elevated grade of the Culver line at a point about 371 ft. east of Tenth Avenue. The low bidder on the contract was Thomas Dwyer of Broadway and 215th Street, New York City, and his price for the work was $42,268.

International Railway, Buffalo, N. Y.—The village board of Lancaster has asked the International Railway to double-track its Buffalo, Depew & Lancaster division to handle the increasing traffic over this surburban line. The village has also asked for additional car service during the rush hours. A number of large industries are located in Depew and the traffic on this division has greatly increased within the last two years.

Interborough Rapid Transit Company, New York, N. Y.—Bids will be received by the Public Service Commission for the First District of New York, 120 Broadway, New York, until Dec. 14 for the installation of cable-feed pipes for part of the Seventh Avenue-Lexington Avenue line.

Niagara River & Eastern Railway, Niagara Falls, N. Y.—The stockholders of the Niagara River & Eastern Railway have authorized the directors to renew their application to the Public Service Commission for the Second District of New York for permission to construct a double-track electric line from Lockport, N. Y., to the Devil's Hole, near Niagara Falls, N. Y. [March 18, '16.]

Piedmont & Northern Railway, Charlotte, N. C.—A survey has been made by the Piedmont & Northern Railway for an extension from Gastonia to Kings Mountain. This is a section of the line to be built to complete the gap between Gastonia and Spartanburg.

Stark Electric Railroad, Alliance, Ohio.—This company reports that during 1917 it expects to construct a line between Alliance and Marlboro, 6 miles.

Cleveland, Akron & Canton Terminal Railway, Cleveland, Ohio.—J. J. Breitinger, who is associated with O. C. Barber of Barberton in the plan for constructing an electrically operated subway under East Fifty-fifth Street, Cleveland, stated recently that work on the improvement will be begun in the spring. [Aug. 28, '15.]

***Dayton, Ohio.**—It is reported that Will I. Ohmer, president of the Recording & Computating Machines Company, contemplates the construction of an electric railway from the center of the city to the factory of the company.

***Tiffin, Ohio.**—Plans are under consideration for the construction of an electric railway from Gibsonburg to Tiffin, via Helena, Millersville, Burgoon, Bettsville and Maple Grove, and from Tiffin to Marion, via McCutcheonville, Upper Sandusky and Harpster. Owen A. Charles, secretary of Chamber of Commerce, Tiffin, is reported interested.

Brantford & Hamilton Electric Railway, Brantford, Ont.—This company is constructing a 1500-ft. extension from Market Street, the present terminus of the company's line in Brantford, to the Lake Erie & Northern Railway station.

Brantford (Ont.) Municipal Railway.—An extension is being built by the Brantford Municipal Railway on Morrall Street, Brantford.

Port Arthur (Ont.) Civic Railway.—The Port Arthur Civic Railway will resurface the tracks on Cumberland Street from McVicar to Arthur Street and will replace the present rail joints with 100-lb. joints.

Northwestern Pennsylvania Railway, Meadville, Pa.—Construction has been completed on this company's new line from Cambridge View to Venango, 3½ miles. The new line replaces about 3 miles of track between Cambridge Springs and Venango, which will be abandoned.

Houston, Richmond & Western Traction Company, Houston, Tex.—It is reported that contracts for supplies and equipment will be let by the Houston, Richmond & Western Traction Company some time in February or March, 1917, for its proposed line between San Antonio and Houston. Ed Kennedy, Houston, purchasing agent. [Nov. 11, '16.]

Ogden, Logan & Idaho Railway, Ogden, Utah.—A report from the Ogden, Logan & Idaho Railway states that the company is constructing 9 miles of line south from Kent.

Salt Lake & Ogden Railway, Salt Lake City, Utah.—Material has been received, and work will soon be begun by this company on the double-tracking of its line between Farmington and Riverdale, 5 miles.

Blue Ridge Light & Power Company, Staunton, Va.—This company proposes to construct an extension in Staunton.

SHOPS AND BUILDINGS

Visalia Electric Railroad, Exeter, Cal.—Plans are being made by the Visalia Electric Railroad to construct a modern passenger station and freight station at the end of its El Mirador extension.

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind.—This company has purchased the Federal League Ball Park in Indianapolis, comprising about seven acres of ground within a few blocks of the central business district of the city to be used as a site for new interurban freight terminals for all interurban lines entering Indianapolis. The work of removing the grandstands and other structures on the ground will commence at once, and plans are now being made for the new buildings to be erected by the Terre Haute, Indianapolis & Eastern Traction Company. The work on the new buildings will probably commence in the spring of next year.

Kansas City (Mo.) Railways.—It is reported that five of the eleven carhouses of the Kansas City Railways will be abandoned. These five will be merged with the six larger divisions that are to remain. This change is to be made so that the system may be centralized more. The carhouses which will be maintained will be remodeled and recreation and rest rooms provided.

Northern Ohio Traction & Light Company, Akron, Ohio.—The substation, transformers and carhouse, including eight cars, of the Northern Ohio Traction & Light Company, at Massillon, were recently destroyed by fire, causing a loss of about $50,000.

Rhode Island Company, Providence, R. I.—This company will abandon its present headquarters at the Union Station and move to the corner of Fountain and Mathewson Streets as soon as the three-story Palmer block can be increased to seven stories. It is expected that the block will be finished next July.

POWER HOUSES AND SUBSTATIONS

Albany (N. Y.) Southern Railroad.—Preparations are being made by the Albany Southern Railroad to extend its electric transmission line from Brainard into the town of New Lebanon, where the company has recently been granted a franchise.

Columbus, Delaware & Marion Railway, Columbus, Ohio.—Orders have been placed by Eli M. West, receiver for the Columbus, Delaware & Marion Railway Company, for new equipment for the Marion and Stratford power plants and the Prospect substation, to cost about $27,000. Contracts have been placed for copper wire and transformers amounting to about $6,000, for the local lighting system. The equipment for the Marion power plant will consist of a 750-kva. frequency changer set, one 50-kw. motor-driven exciter set, three switchboard panels, and one voltage regulator. Three 220-kw. transformers, which the company has in stock, will also be installed. At the Stratford plant one 425-hp. Heine boiler and smokestack and one 3000-gal.-per-minute turbine-driven centrifugal circulating pump will be installed. Three 100-kw. transformers will be placed in the Prospect sub-station.

Toledo Railways & Light Company, Toledo, Ohio.—Work on the proposed new central electric generating station of the Toledo Railways & Light Company will be rushed as rapidly as possible. The present generating facilities of the company are now taxed to the utmost, and a 20,000-kw. generating unit will be added to the equipment in the present plant to care for the local power load until the new plant is in operation. The present generating capacity, by the addition of the new unit, will be brought up to 85,000 kw. An order for the first of the 20,000-kw. units for the new central station has been placed with the General Electric Company, and it is expected that further orders for additional units will be placed before the completion of the new powerhouse.

Monongahela Valley Traction Company, Fairmont, W. Va.—An agreement has been entered into between the Monongahela Valley Traction Company and the Clarksburg Light & Heat Company by which a large transformer station will be erected in Clarksburg to enable the companies to supply energy to one another in case of emergencies.

INDUSTRIAL NEWS

Review of Trade and Market Conditions

Rolling Stock Purchases **Business Changes** **Trade Literature**

RISING PRICES DISCUSSED IN NEWARK

Contributions from Several Departments of the Public Service Railway Depict Graphically the Hampering Effects of the Present Abnormal Stringency in Labor and Materials

At the meeting of the American Electric Railway Association Company Section of the Public Service Railway, held in Newark, N. J., on Nov. 16, representatives of the several departments of the railway discussed the effects of the rise in prices upon their several lines of work. As stated in the issue of the ELECTRIC RAILWAY JOURNAL for Nov. 18, page 1062, after an opening paper on public relations by Ex-Senator E. W. Wakelee, associate general solicitor of the company, J. A. Pearson, purchasing agent, opened a discussion on "The Effect of the European War on Market Prices and Deliveries of Railway Material." He was followed by G. J. Newton, local purchasing agent; General Manager R. E. Danforth; F. L. Foulks, distribution department; H. H. George, construction department; P. F. Maguire, maintenance-of-way department, and A. Scheer, Jr., mechanical department. As the subject of rising prices was thus covered so comprehensively, it has been deemed advisable to summarize in this department the data and opinions included in the remarks of these speakers.

THE PURCHASING AGENT'S POINT OF VIEW

By way of introduction, Mr. Pearson said first that he, as purchasing agent, felt like an operating man and wished to be considered as such. Comparing his topic with that of public relations he said that the latter is indefinite and has to be handled with gloves, while the purchasing agent deals with prices, so that purchasing is an exact science. The remarkable thing about the effect of the European War on prices in this country was that for about a year the effect was negligible. In fact, in the early part of 1915 prices were very low. There was great depression, the mills had little work, and the railways had no trouble in getting deliveries of all kinds of materials at the low prices. About Sept. 1, 1915, the effect began to be felt and it was noticed that the railroads could not obtain sufficient freight cars. Embargoes were placed on deliveries of goods all over the East. Last winter there were in and around the port of New York 18,000 freight cars containing all kinds of material which could not be moved. Public Service was not greatly affected except that on the South Amboy pier about 7000 freight cars loaded with coal were accumulated. It was, however, very difficult to move goods through the State of New Jersey and prices on all goods began to rise.

In the spring of 1916 there appeared to be a lull in the congestion, so that from May to July the pressure for material decreased. But in September prices began to climb again and deliveries to be delayed, until to-day conditions are twice as bad as they were a year ago.

Mr. Pearson emphasized the fact that during his twenty years' experience as purchasing agent he has never seen a situation like the present one, the difficulty applying to every item of a railway's requirements, even blotting paper, pens and ink. He believes, however, that soon after the close of the war, which apparently will last from one to two years longer, prices will be greatly reduced. The foreign demand will cease and there will be active competition for our markets.

Coming to the subject of the immediate future, Mr. Pearson advised early placing of requisitions and the carrying of liberal stocks. He stated that while it may seem ridiculous in 1916 to talk about ordering goods for 1918 delivery, that is the best that can be secured in some lines. For instance, a steam turbine cannot be bought to-day for delivery before 1919. On the subject of increases in prices, Mr. Pearson quoted, as examples, the following: "In 1914 we paid 19 cents a pound for brass pipe, whereas in November, 1916, the price was 41 cents, an advance of 110 per cent. Condenser tubes which under the company's last contract cost 18 cents per pound were recently offered for delivery next May at 53 cents as a special favor. Track spikes which in 1914 were bought for $1.40 per hundredweight, now cost $2.75, an advance of 97 per cent. In 1914 the discount on machine bolts was 75 and 5, while to-day it is 25 and 5, an advance of 250 per cent. The advance in twist drills has been 250 per cent, tie rods 50 per cent, tamping picks 40 per cent, steel pipe 70 per cent, iron wood screws 92 per cent. Brass screws have advanced to an unheard-of degree, while cold rolled steel has gone up 183 per cent.

"Car wheels are about 21 per cent higher than in 1914 with deliveries of from twelve to eighteen months, while rails are $6 per ton higher with about the same deliveries. Copper is very important to the railway company and the effect of the rise from 18¾ cents to 32 cents is very serious. While the railway is not directly concerned in the price of coal, as energy is purchased from the Public Service Electric Company, it is of interest to note that while the company has long-term contracts the contractors are not able to live up to them, due to shortage of cars and other difficulties. It has been necessary, therefore, to buy coal at an advance of $4 per ton."

Comparing the railway with the manufacturer under the present abnormal conditions, Mr. Pearson pointed out that the latter is making so much money that he can afford to buy raw material regardless of cost. The railway, restricted to a 5-cent fare, must purchase economically, but its business is not considerable compared with that of manufacturers and its purchasing agent is helpless in the present market. Material can be had at some price, but the railway desires to make some money, which cannot be done by paying bonuses. It is necessary, therefore, for the men in the several departments to look ahead and give the purchasing agent all possible time.

OFFICE SUPPLIES ARE HARD HIT ALSO

Mr. Newton confined his attention to the subject of stationery, noting particularly that some papers have more than doubled in price, for example, bond paper, of which a good watermark grade could be bought recently at 6½ cents per pound, now brings 14 cents. The importation of sulphite from Europe has ceased and American manufacturers seem not to be able to provide a suitable substitute. Apparently the amount of sulphite put into paper has been reduced and the quality has suffered while prices have increased. Deliveries, also, are very slow. The following table is indicative of the situation:

Material	Former Price	Present Price
Bond paper, cents per pound	6½	14 2 cents more for colored stock
Manila writing paper, cents per pound	4½	12
Ledger paper, cents per pound	10½	18 2 cents more for colored stock
Scratch pad paper, cents per pound	4	10
Kraft paper, cents per pound	4	12
Gem clips, cents per thousand	16	40
Brass fasteners, cents per thousand	52½	93¼
Ink, dollars per dozen quarts	$3.60	$6.00
Pins, cents per pound	32	70

HOW THE WAY DEPARTMENT IS AFFECTED

Messrs. Maguire and George went into details of track construction prices, stating, as an example, that hard-center special-work construction cost 35 per cent less a year ago than to-day, while the cost of solid manganese steel construction has gone up 65 per cent and is still rising. This is due to the increase in the cost of manganese from $100 to about $500 per ton.

Last year the company was able to place an order for a bridge at 2¾ cents per pound, while now the price is 6¼ cents, or 127 per cent increase. In the item of rail braces and tie rods the increase has also been large. Seven-inch braces for tram rail have gone from 23 cents to 34 cents each, an increase of 47.8 per cent; those for 7-in. groove girder rail from 20 cents to 34 cents, an increase of 70 per cent. Tie rods which formerly cost 24 cents have gone to 36 cents each, a 50 per cent increase.

Mr. George also took up the subject of lumber and ties. Creosoted yellow pine ties, 6 in. x 8 in. x 8 ft., formerly cost 83 cents each, but are now $1, a 20-per cent increase; whereas untreated chestnut ties formerly 50 cents are now 62 cents, an increase of 24 per cent. Bridge timber has gone up from 28 per cent to 69 per cent, depending upon the size; 12-in. x 12-in. long leaf yellow pine, for example, being now $41 per 1000 ft. as against $32 last year, whereas 8-in. x 6-in. timber is $65 as against $38.50. Three-in. x 10-in. timber is $42; 6-in. x 8-in., $36; 8-in. x 8-in., $37, and there has been a general increase in the price of creosoted yellow pine lumber of about $15 per 1000 ft.

Mr. George also gave the following table showing the general increase in the cost of paving by contract for this year and last, the prices not including the concrete foundation or the rail plaster along the webs of the rails.

Type of Pavement	Price Per Square Yard, 1915	Price Per Square Yard, 1916	Percentage Increase
Granite block, cement joints	$2.25	$2.45	8.9
Granite block, tar joints	2.39	2.56	7.1
Granite block, sand joints	2.08	2.25	8.2
Trap rock block, cement joints	1.65	1.70	3.1
2d hard clipped block, cement joints (clipping and laying)	.82	.87	6.1
2d hard unclipped block, cement joints (laying only)	.56	.61	8.9
Newark specification granite block cement joints	2.70	2.90	7.4
Newark specification granite block, tar joints	2.85	3.02	6
Newark specification granite block, sand joints	2.60	2 77	6.5

The company has had to pay as high as $3.78 per square yard for granite block pavement laid with cement grouted joints, including the concrete base. This would be about $3.20, not including the foundation. Along with the increase in prices of material have gone increases in labor costs, the minimum increase being about 20 per cent. In addition it has been necessary in some cases to reduce the working day from ten to nine hours, although payment is made for ten hours work. The higher-priced men have been most loyal to the company, so that the actual increase for track labor has been at least one-third. In some cases skilled men have been required to do track labor, increasing the cost very much more.

Among other items mentioned by Mr. George were the following: Standard steel inter-track picket fence, which formerly cost about $2.25 per linear foot erected, cannot now be had for less than $2.83 per foot, not including erection; the lowest bid for fence erected being $4.10. The present price is at the rate of approximately 8 cents per pound for steel, an increase of 82 per cent. Concrete foundation in tracks has gone from about $5 to $6 per cubic yard or from about 50 cents to 60 cents per linear foot of track. Six-inch terra-cotta pipe has gone from 13 cents to 16 cents per linear foot and other sizes in proportion. Cast-iron drain boxes, formerly 1½ cents per pound, are now more than 2 cents. Green paint, used on steel trolley poles, formerly 14 cents, is now 27 cents, an increase of 93 per cent. Taking an average of twenty-eight items entering into track construction, there is an increase for 1916 over 1915 of 43½ per cent, making an actual increase in the cost of track construction work of from 20 per cent to 30 per cent.

Testimony from the Line Department

Mr. Foulks naturally dwelt upon the subject of copper, in which the distribution department is most interested. He used a price chart in explaining the fluctuations in this material, applying this to conditions on the local property. He said that approximately 215,000 lb. of copper were used in 1915, exclusive of composition line castings, bond wires, etc. which would require 40,000 lb. more. If purchased in May, 1916, instead of September, 1915, this amount of copper would have cost $76,250 more than it did, an increase of 51 per cent.

To illustrate the effect of high prices on the distribution department, Mr. Foulks presented the following table:

	1913	1916	Increase
Bond wires, 10 in.	$0.4050	$0.5850	45 per cent
Bond wires, 12 in.	0.4385	0.8120	85 per cent
Bond wires, 36 in.	0.8078	1.4960	85 per cent
Composition Castings	1914	1916	Increase
Approach ears	$0.18	$0.27	50 per cent
No. 17 splices	1.05	1.22	16 per cent
No. 29 splices	0.57	0.782	37 per cent
No. 00 ears	0.248	0.31¼	26 per cent
Galvanized Span Wire	1913, Per 100 Ft.	1916, Per 100 Ft.	Increase
¼ in.	$0.73	$1.05	44 per cent
5/16 in.	0.885	1.28	44 per cent

He also said that a recent quotation from one manufacturer for a large quantity of No. 00 ears was 46 cents, although it was actually placed with another manufacturer for 38 cents. There has been a recent advance of 12½ per cent on all inclosed fuses.

How the Mechanical Department is Affected

Mr. Scheer opened his part of the discussion by a humorous reference to a recent experience in purchasing steel bolsters for the cars which the company plans to build next one. One steel company facetiously asked, "Well, can't you gentlemen come in about a year? We are closing out all orders and are not taking on anything new for the coming year." Manufacturers seem to be developing considerable facility in explaining why deliveries are not made, but the fact remains that the railway cannot get the material. In regard to the labor situation Mr. Scheer said that while it is true that the hourly rate paid by manufacturers is higher than the rate paid by the railway, a considerable part of the high weekly wage which proves so attractive to many workmen now is partly due to overtime.

To illustrate the increase in prices in mechanical department supplies, Mr. Scheer quoted the following table:

	1914	1915	1916
Babbitt-metal, per lb.	$0.286	$0.31	$0.38
Brass bearings, each	2.62-3.40	2.79-3.02	4.47-5.68
Steel wheels, each	11.59	14.42	18.89
Axles, each	8.77	6.58	16.68
Copper wire, per pound	0.155	0.164	0.326
White lead, per pound	0.06	0.06	0.091
Brooms, each	0.342	0.33	0.42
Linseed oil, per gallon	0.485	0.60	0.73
Rubber hose, per foot	0.028	0.027	0.031
Machine bolts, each	0.026	0.023	0.067
72-in. canvas, per foot	0.20	0.18	0.29

Applying these data to the local railway, he said that the 5000 lb. of babbitt metal used per month will represent an annual increase of $5,640 over the cost in 1914. Similarly, the 366 brass bearings used monthly will cost $18,156 more per year; steel wheels, $5,436 per year; axles, $3,408 per year. In the item of bolts, 2500 of the 3-in. to ¾-in. x 2½-in. size are used per month. In 1914 they cost slightly over 2 cents each, but now they cost more than 6 cents, the increase being 158 per cent. In this small item alone there is an annual increase of $1,230. The total increase for the few items mentioned above is $38,870 per year, a striking instance of how the war is affecting the mechanical department.

The General Manager's Point of View

In closing the discussion abstracted above, Mr. Danforth said that with the increased cost of material averaging about 30 per cent, the company will spend about $1,500,000 next year in the ordinary operation of the property, using the same quantities of materials as usual. In view of the circumstances brought out in the discussion it is evident that the maximum life must be obtained from all parts of the equipment. Nothing should be wasted, from stationery to car wheels. To offset the increase in cost of operation the cars must be made to earn more. A reduction in the cost of accidents would help in this direction. His closing sentence sums up the situation: "Let's save the pennies where we can, the dollars will take care of themselves."

JOHN F. OHMER DISCUSSES REGISTER MANUFACTURE

Increased Demand and Greater Use—Production Cost Figures Abnormal—Paper Supply Presents a Serious Problem

The abnormally high material prices have enforced conditions upon the manufacturers which have been very difficult to meet. In a recent interview, John F. Ohmer, president Ohmer Fare Register Company, Dayton, speaking of the manufacturing and sales condition in the fare register field pointed out what high material and labor prices mean to a company which rents its product on a long-term basis. Business for his company, Mr. Ohmer said, has been good this year, particularly since June. A very high proportion of the users of his company's fare registers have renewed their contracts, new companies have been added as customers, and a large number of additional registers have been required for use in the increased car service now given.

WAGES ARE 50 PER CENT HIGHER

The Ohmer fare register is rented for five or six-year terms, and the repairs and renewals of the machines are made by the manufacturer. This means, under present conditions, a very greatly increased cost not only for the materials and supplies required in maintenance work, but higher living costs for the maintenance men.

Moreover, as in other lines of manufacture, the cost to produce registers, and especially to develop new products, is higher than ever before contemplated. Wages have been increased at least 50 per cent during the last two years. Tool makers, many of whom are employed in register manufacture, receive from 60 cents to 67½ cents per hour, and some shop employees on special development work are paid wages as high as $80 a week.

The materials mostly used in register work are those which have shown the greatest rises in price. Brass that three years ago cost 13 cents a pound is now from 40 to 45 cents. Light malleable castings have risen from 6 to 18 cents a pound. Soft sheet steel has risen 200 to 300 per cent, high-speed steel 500 per cent, and the alloy used for die-casting register printing wheels and other essential parts is now quoted at about 80 cents per pound.

PAPER SUPPLY SITUATION VERY DELICATE

A most important feature of the Ohmer fare register is the printed permanent record of the fare transactions. Thus the demand for register paper increases with the traffic of the electric railways. Rolls of specially prepared paper are sold to the railways for use in the registers. The rental contracts contemplate that the register manufacturer will supply suitable paper at a fair cost, subject to fluctuation of the market. At the present time the paper is costing more than its selling price. No attempt has ever been made to profit by the sale of paper, and now that its price ranges between 9½ and 11 cents per pound, with prospects of further increases, the growing demand for paper means a greater loss. The sales price has not been increased.

The amount of paper supplied during a year for use in Ohmer registers is many tons. The stock is special and available from only one mill. It is a part linen paper, the make-up and finish having been determined only after several years of use. This paper is suitable for use in high and low altitudes and in hot and cold climates. It now is very difficult to obtain at any price. Substitute papers cannot be used if satisfactory printing results are expected.

The paper is received from the mills in large parent rolls. These are cut, and small rolls of sizes suited to various types of registers are prepared. In rerolling, the stock is inspected for surface and gaged for width and thickness. Thus the first cost of the stock is only part of the final cost of the printing register paper cost.

The ink rollers of the fare registers, according to Mr. Ohmer, represent the greatest cost increase per part of the elements of a register. These are made of very high-grade felt, impregnated with a special ink. Felt has risen greatly in price, and dyes for the special ink used are hardly obtainable even at unheard-of prices. The manufacturer who supplies the ink has only a limited supply of dye, and this was purchased at $1,500 a ton.

Mr. Ohmer has always shown great interest in the welfare of his employees. He has introduced into his plant many features which have brought working conditions to the highest level. Last August he addressed the following bulletin to his employees. It is pertinent to the wage-earners whose pay is now much higher than it has ever been, except at present.

"SAVE NOW

"No man knows when or how the European war will terminate, and no man knows what the economic and industrial condition in this country will be following the adjustments which must be made all over the world after the tremendous destruction of life and property in Europe ceases.

"After the Franco-Prussian War of 1870 and 1871, *i. e.*, in 1873, the United States of America suffered the worst financial panic on record, causing great depression in all lines of business activity, coupled with much distress and suffering for a number of years. It, therefore, behooves us to lay aside some of our earnings to carry us over the stormy days which may follow the close of the European conflict. Save now while the saving is good."

ELECTRIC WELDERS RENEW MUCH TRACK

E. C. Price Explains the Reasons for Exceptional Demands for Track Repair Materials

At the close of the construction and repair season inquiries for the Indianapolis portable electric welder are even more numerous than they were during the open season. This statement and those which follow are based on a recent interview with E. C. Price of the Indianapolis Switch & Frog Company, Springfield, Ohio. This company's November sales of welders, joint and bonding plates and special welding steel exceeded those of any previous month.

Mr. Price attributes the present activity in welder and welding material sales to the difficulties encountered by the electric railways in buying rails and other track renewal and repair essentials. "Why should a railway," he says, "install new track now at premium prices, when it is possible to repair it and avoid double costs for materials, such as rails, which have a normal life of ten to twenty years? The rail situation to-day, with the makers asking premiums of $20 to $30 a ton and insisting on contracts carrying with them unchangeable and uncancellable specifications, has put the special work makers into a guessing competition."

In July, it is stated, the mills made the ruling that contracts must carry the specifications with them. Formerly a fabricator could contract for a tonnage of rail, and later, as his orders warranted, he could specify the section of rail to be delivered. Now he must specify when he makes the contracts and, as everyone knows, the deliveries are remote. "Thus," Mr. Price says, "the individual special-work makers are embarrassed for rail and cannot accept all the business offered. And all the rail in the store yards of the frog builders if it were properly exchanged as orders for frogs were received would not build all the frogs that the railroads now desire to order.

"This difficulty and others with which the electric railways are confronted has forced them to a more general use of reclamation methods. One of these is the use of the Indianapolis welder for filling rail cups and renewing joints by welding on plates."

RAIL JOINT WORK EXPANDS RAPIDLY

Rail joint work with this welder has increased enormously during 1916. The number of joints applied so far this year is double that for 1915. In 1912, when the process was new, less than fifty joints were applied, and since that year nearly 50,000 joints have been put on with the Indianapolis welder.

More than 200 welders have been sold to the electric railways. The Bay State Street Railway and the Public Service Railway each use seven outfits, and many other roads have four or five. These outfits are almost entirely engaged in track work. Only three have been purchased primarily for shop work. Of course, on rainy and cold days some roads use their outfits for shop repair work, but their primary use is for rehabilitating track by building up cupped rails, repairing broken and worn special work and for applying new joint plates.

The Ohio Electric Railway made use of its welder recently for welding rails and rail chairs to the floor of a 70-ft. bridge.

As an indication of the active use of the 200 welders in service, Mr. Price stated that during 1916 his company had sold 600,000 lb. of coated, fluxated welding steel rods. About 31,000 lb. of this was for welding manganese steel special work. Of the total sold, 300,000 lb. was for applying joints and general shop work, and an equal amount for filling rail cups and building up manganese centers.

The price of welding steel has not been changed since 1912. A large stock has, with difficulty, been maintained by a safe margin until the recent great demand for track renewal work lowered the reserve somewhat. Mr. Price says that this special welding steel is essential if good results are to be assured.

ROLLING STOCK

Nashville (Tenn.) Interurban Railway, has placed an order for one freight car with the Southern Car Company, High Point, N. C.

South Boston Industrial Railroad, Boston, Mass., has ordered, through the Wendell & MacDuffie Company, Eastern agents for the Russell Car & Snowplow Company, one single-truck snowplow.

Buffalo & Lake Erie Traction Company, Buffalo, N. Y., is said to be in the market for fifteen city cars similar to the ten purchased by this company in 1915 and also for seven center-entrance interurban cars.

United Railways & Electric Company, Baltimore, Md., noted in the Electric Railway Journal of Oct. 28 as purchasing seventy-five double-truck, semi-convertible, four-motor pay-within cars, will purchase twenty-five additional cars of this type.

Alton, Granite & St. Louis Traction Company, Alton, Ill., has purchased five new cars, three of them to be chair cars, with motors, and two passenger trailer cars. The three motor cars will be of steel, with center entrances, and will have a capacity of forty-six passengers each. The trailers will have center aisles and cross seats, and will each carry sixty passengers. The plan will be to improve the interurban service between Alton and East St. Louis by using two-car trains part of each day.

TRADE NOTES

Horace N. Trumbull has been appointed advertising manager of the S K F Ball Bearing Company of Hartford, Conn.

George K. Morrison, who has been identified for many years with General Electric Company, has been elected vice-president of the organization.

Johnson Fare Box Company, Chicago, Ill., through its Eastern agents, the U. S. Metal & Manufacturing Company, has just received an order from the International Railway, Buffalo, N. Y., for thirty-five of its fare boxes.

Holden & White, Chicago, have been appointed general sales agents by the Garland Ventilator Company for the sale of Garland ventilators in the steam railway field as well as the electric railway field.

Terry Steam Turbine Company, Hartford, Conn., announces the appointment of Stephenson & Nichols, Monadnock Building, San Francisco, as its representatives in northern and central California and the northern part of Nevada.

Peter Smith Heater Company, Detroit, Mich., has received an order for eighty-one hot-air forced-ventilation heaters, six hot-water heaters and seven equipments of gravity-type electric heaters. These heaters will be installed on ninety-five cars recently ordered for city service in Akron and Canton, Ohio, Evansville, Ind., Rockford and Springfield, Ill., Saginaw, Detroit and Grand Rapids, Mich.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has received a number of large orders for motor equipment within the last few weeks as follows: Hodenpyl, Hardy & Company, New York, N. Y., have purchased twenty-nine double equipments of 532-B 50 hp. motors for roads at Rockford and Springfield, Ill., and Evansville, Ind.; also five quadruple 140 hp. 600-1200 volt equipments with HLF control for Michigan Railways, Jackson, Mich. The Detroit United Railway has purchased eight quadruple 140 hp. high speed equipments with HL control. The Lake Shore Electric Railway has ordered thirteen quadruple 140 hp. 600-1200 volt equipments with HL control and four quadruple 40 hp. equipments.

McQuay-Norris Manufacturing Company, St. Louis, Mo., announce the removal of its Chicago office to 1140 South Michigan Boulevard. It also announces that L. H. Dally has succeeded H. G. Paro as manager of the Chicago branch, and H. W. Sweeney has succeeded F. W. McKeen as manager of the Pittsburgh branch. R. W. Long has been transferred from the field force of engineers, and will manage the Denver branch.

ADVERTISING LITERATURE

Anglo-American Varnish Company, Newark, N. J., has issued a booklet on its railway varnishes.

Gurney Ball Bearing Company, Jamestown, N. Y., has issued Vol. II of its publication, "Bearing on Bearings."

Automatic Ventilator Company, New York, N. Y., has issued a pamphlet on its Flower brush holder for railway motors.

Armstrong Cork & Insulation Company, Pittsburgh, Pa., is distributing a booklet on its nonpareil corkboard insulation.

Jeffrey Manufacturing Company, Columbus, Ohio, is distributing bulletin No. 141 on its single roll coal-crusher for power houses.

New England Oil, Paint & Varnish Company, Boston, Mass., has issued a pamphlet on an impregnable coating for cement and brick.

Drew Electric & Manufacturing Company, Indianapolis, Ind., has issued a pamphlet on its motormen's safety mirror for closed or for open cars.

Hyatt Roller Bearing Company, Newark, N. J., has issued bulletin No. 1523 of "Engineering Helps" on the selection and mounting of its roller bearings.

Gould Coupler Company, New York, N. Y., is distributing a pamphlet on its universal truck lever type automatic brake adjuster for Brill 39E. and 27F. trucks.

Railway & Industrial Engineering Company, Pittsburgh, Pa., is distributing a pamphlet on outdoor transformer substations protected by Burke Horn Gap equipment.

Shepherd Electric Crane & Hoist Company, Montour Falls, N. Y., has issued bulletin M-1 on its form 2XS floor-operated, single-speed, direct-current electric hoist.

Weiss Manufacturing Company, Springfield, Ill., is distributing a pamphlet on its non-freezable street railway switch equipment, which includes Weiss switch blocks.

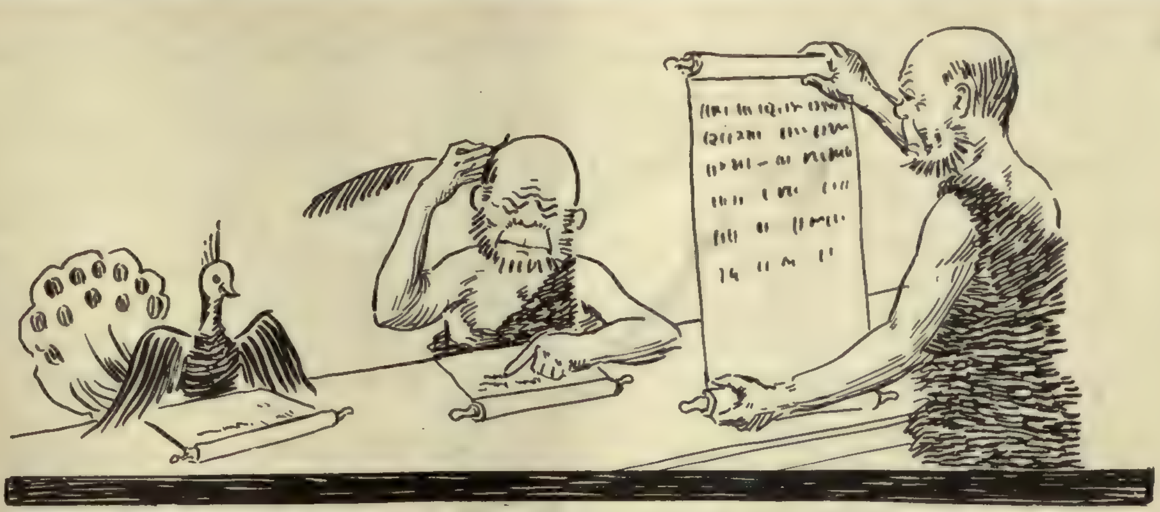
Lord Manufacturing Company, New York, N. Y., has issued a bulletin on the National Safety Device & Manufacturing Company's air rectifier which is designed to eliminate frozen air.

Lackawanna Steel Company, Buffalo, N. Y., has issued a 32-page catalog on the Abbott rail joint plate, which is a device to strengthen and improve the efficiency of the ordinary angle-bar joint.

Albert & J. M. Anderson Manufacturing Company, Boston, Mass., is distributing a pamphlet on a testing clamp suitable for testing watt-hour meters, or to be used in any place where temporary electrical connections are desired.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued leaflet 3510-A on its No. 101-K railway motor. This is a 30-kw., 40-hp., 600-volt motor and is especially adapted to the operating conditions requiring the handling of heavy loads at slow speed.

Link Belt Company, Chicago, Ill., has issued a booklet describing its traveling water-intake screens. The installation at the Philadelphia Electric Company stations is described and illustrated. The Metropolitan West Side Elevated Railway Company of Chicago purchased the first screen built by this manufacturer for installation in 1895. Other booklets recently issued describe the Link Belt coal and ash handling equipment for power stations, locomotive cranes for storing and reclaiming coal and the details of the Peck carrier for coal and ash handling.



Peacock Brakes Will Win on a Civil Service Basis

Those long-headed old Irish were as keen about picking poets on a merit basis as they were in selecting kings.

Why as early as the third century, the Fianna, or Fenians, had developed a high-class civil service—applicants for membership had to show that they could make good by producing the goods.

Long-headed railway men of today are putting the civil service test up to brake applicants. They don't want claims—they want answers to questions like these:

Have you got a quick-winding eccentric?
Have you got an automatic stop?
Have you got a balanced gear ratio?
Have you got an easy-turning roller bearing?

Only the Peacock Brake will pass that examination with a rating of 100 per cent.

National Brake Co.

Buffalo, N. Y.

Bankers and Engineers

Electric Railway Lighting and Power Company Bonds
ENTIRE ISSUES PURCHASED
THE NATIONAL CITY CO.
NATIONAL CITY BANK BUILDING
55 WALL STREET, NEW YORK

THE J-G-WHITE COMPANIES
ENGINEERS CONTRACTORS
FINANCIERS OPERATORS
43 EXCHANGE PLACE . . . . NEW YORK
LONDON SAN FRANCISCO CHICAGO

THE ARNOLD COMPANY
ENGINEERS—CONSTRUCTORS
ELECTRICAL—CIVIL—MECHANICAL
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ENGINEERS
CHICAGO BOSTON
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Plans, Specifications, Supervision of Construction
General Superintendence and Management
Examinations and Reports
Financial Investigations and Rate Adjustments

ALBERT S. RICHEY
ELECTRIC RAILWAY ENGINEER
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WORCESTER, MASSACHUSETTS

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ENGINEERS
MILWAUKEE CHICAGO
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Arthur D. Little, Inc.
An organization prepared to handle all work which calls for the application of chemistry to electric railway engineering—such as the testing of coal, lubricants, water, wire insulation, trolley wire, cable, timber preservatives, paints, bearing metals, etc.
Correspondence regarding our service is invited.
93 Broad Street, Boston, Mass.

H. M. Byllesby & Company, Inc.
NEW YORK, Trinity Bldg. CHICAGO, No. 208 So. La Salle St. TACOMA Washington
Purchase, Finance, Construct and Operate Electric Light Gas, Street Railway and Water Power Properties.
Examination and reports. Utility Securities Bought and Sold.

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CONSTRUCTING ENGINEERS
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BUREAU OF INSPECTION TESTS & CONSULTATION
Inspection and Test of all Electrical Equipment
NEW YORK, 90 West St. ST. LOUIS, Syndicate Trust Bldg.
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SANDERSON & PORTER
ENGINEERS
REPORTS • DESIGNS • CONSTRUCTION • MANAGEMENT
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CHICAGO NEW YORK SAN FRANCISCO

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DETECTIVES
Suite 1710 Park Row Bldg., New York
Suite 715 Board of Trade Bldg., Boston

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ENGINEERS
71 Broadway New York
Report, Investigate, Appraise, Manage Electric Railway, Light and Power Properties.

ELECTRICAL TESTING LABORATORIES
Electrical, Photometrical and Mechanical Testing.
80th Street and East End Ave., New York, N. Y.

IT IS A PAYING INVESTMENT
to carry an advertisement in the ELECTRIC RAILWAY JOURNAL every week in the year.

Scofield Engineering Co. Consulting Engineers
PHILADELPHIA, PA.
POWER STATIONS GAS WORKS
HYDRAULIC DEVELOPMENTS ELECTRIC RAILWAYS

EDWARD P. BURCH, Engineer
ELECTRIC RAILWAY VALUATIONS
Dime Bank Bldg., Detroit Plymouth Bldg., Minneapolis

AMERICAN BRIDGE COMPANY
HUDSON TERMINAL-30 CHURCH STREET, NEW YORK

Manufacturers of Steel Structures of all classes particularly **BRIDGES AND BUILDINGS**

Transmission Towers at Birmingham, Alabama. Alabama Power Company.

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Atlanta, Ga. . . . Candler Building
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On Ball, Web or Base—It's All One to the Lincoln System

—equally adapted for all these methods of bonding.

The electric arc blends the copper of the bond and the steel of the rail into one structure, without in the least affecting the crystalline structure of the rail.

We want an opportunity to show you how to save from 20 to 50 cents on every bond you install.

THE LINCOLN BONDING CO.
636 Huron Rd.
CLEVELAND, OHIO

Agents: Lewis & Roth Company, 312 Denckla Bldg., Philadelphia, Pa.; Charles N. Wood Company, 79 Milk St., Boston, Mass.

RAILWAY UTILITY CO.

Sole Manufacturers
"Honeycomb" and "Round Jet" Ventilators
for Monitor and Arch Roof Cars, and all classes of buildings; also
Electric Thermometer Control
of Car Temperatures.

721 W. FULTON ST.
Chicago, Ill.

Write for Catalogue

1328 BROADWAY
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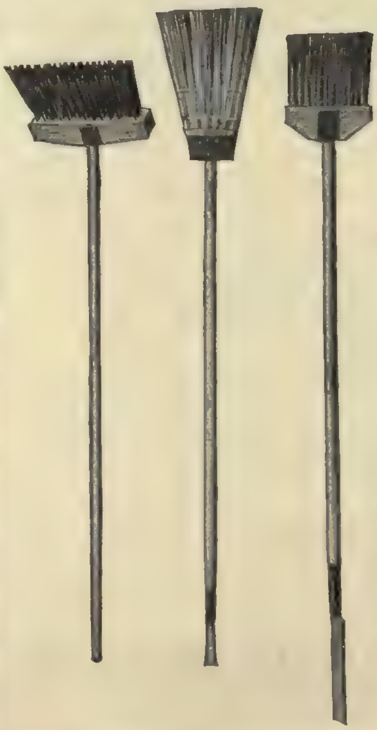
Technical Men Want Facts

Journal advertisers who present facts see ample evidence that their advertisements are read.

A Great Combination



No. 1 to sweep crossings.

No. 2 to handle light dirt and snow in the frogs, switches, and curves.

No. 3 to remove ice, slush and mud from the same places and a chisel point on the end of the handle to loosen the ice and crust.

No. 1 and No. 3 contain Flat Steel Tempered Wire, and nothing superior can be produced. Serviceable all the year round. Your road is not complete without them.

Write for Prices.

J. W. PAXSON CO., Mfrs.
1021 N. Delaware Ave., Philadelphia, Pa.

Just a Part of the Columbia Equipment for Turning out Bearings

You will understand the perfection of Columbia-made products when we tell you that we have several hundred machine tools alone.

Practically each tool, be it drill, shaper, borer, grinder, planer or lathe, is handled by the same man day in, day out.

Such specification inevitably results in turning out the best possible work.

That's only one of many reasons for using Columbia-made products.

TOOLS

Armature and axle straighteners
Armature buggies and stands
Babbitting molds
Banding and heading machines
Car replacers
Coil taping machines for armature leads
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CAR EQUIPMENT

Armature and field coils
Brush-holders and brush-holder springs
Brake, door and other handles
Brake forgings, rigging, etc.
Car trimmings
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Gear cases (steel or mall. iron)
Grid resistors
Third-rail contact-shoes and accessories
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Columbia Machine Works & Malleable Iron Co.

Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

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Blot Out the Cause

ROT

Rot is one of the mighty forces that is always working to the detriment of the maintenance engineer and the company's earnings. Sometimes it's called corrosion, or electrolysis—but with wood it's plain r-o-t.

Reeves Wood Preserver

will mitigate the effects of rot in poles, cross-arms, ties, and all kinds of construction timber.

It is applied COLD with a brush (like paint) or by dipping in an open vat. It penetrates like ink into a blotter and checks rot in its incipiency. The least it will do is to double the life of wood. The most it will cost is but a trifle compared to the savings it will effect in purchases of new material and the cost of erection.

No, it will not corrode the hardware, wash or sweat out. You can prove it yourself with our test outfit.

Write for it to-day

REEVES
TRADE MARK REGISTERED

The Reeves Co.
New Orleans, La.

THE EASY WAY TO PREVENT DECAY

SAFETY ECONOMY renewable cartridge FUSES FIRST

Protect Cars and Power-plant

Don't trust to your more limited facilities for refilling fuses. As fuse specialists, we furnish reliable and carefully ***tested Renewal Links*** all ready to insert in

ECONOMY renewable cartridge FUSES

when they blow. These Links cost but a trifle and assure a complete break in the circuit at the required overload.

There's no need to use an extra new fuse every time one blows when the ***efficient and safe*** Economy fuse can be renewed over and over again with our ***tested*** Renewal Links at a saving of 80% of fuse maintenance expense under old-style, wasteful methods.

Write now for Bulletin No. 17 and our catalog.

Economy Fuse & Mfg. Co.
Kinzie and Orleans St.
Chicago, Ill.

Cut Your Painting Costs

—eliminate the old-fashioned, time-killing brush process, and apply your paint, varnish or lacquer with the

"SPRACO" Paint Gun

It weighs only a trifle over a pound—can be handled easily—has adjustments for air pressure and for feed of paint.

Will not only give you quicker, better work on large, smooth surfaces like car bodies and roofs, but indispensable for intricate or inaccessible parts such as fenders, brake-rigging, trucks, etc. Detailed information is yours upon request—write!

SPRAY ENGINEERING CO.

Engineers **Manufacturers**

93 Federal St. **BOSTON**

Engineers for

Spray Cooling Ponds, Irrigation Systems, Air Conditioning, Aerating Reservoirs, Odor Condensers, Gas Washing, Installations.

Manufacturers of

Air Washers for Steam Turbine Generators, Spray Nozzles and Spray Pond Equipments, Paint Spraying Apparatus for Bodies, Trucks and Fenders, Humidifiers, Asphalt Nozzles, Gas Washers, Park Sprinklers, Aerating Nozzles, Sewage Nozzles, Flow Meters.

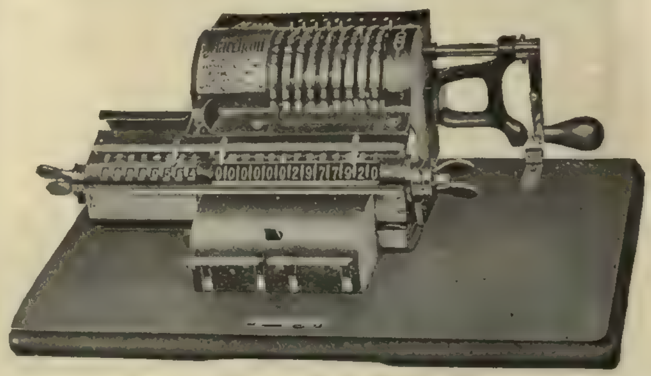
It applies the paint in a jiffy—evenly—wastelessly

THE CHICAGO & ALTON RAILROAD COMPANY,
Accounting Dept., E. S. Benson, Comptroller,
Railway Exchange Bldg., Chicago, Feb. 16, 1915.

MR. HOWARD C. NAGEL,
District Sales Mgr. Marchant Calculating Machine Co.,
Inc., 3736 Cottage Grove Ave., Chicago, Ill.

Dear Sir:—This Company purchased one of your machines two years ago and have used same very extensively since that time in our Statistical Bureau in figuring percentages, etc., and can state that this machine has given us the very best service and entire satisfaction.

Yours truly,
C. D. SIPI,
Auditor Freight Accounts.



Speed Up All Your Computations!

All through your office, you can effect big savings in time, money and brain-power by using the

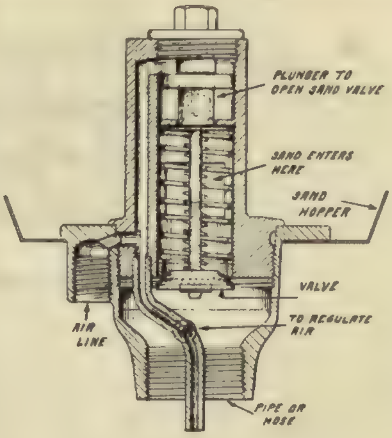
Marchant Calculator

Anyone can learn to operate the MARCHANT from the instruction book. For example: To multiply 535 by 35 simply pull lever to 535. Turn the handle 5 times; then shift carriage by automatic shift; turn handle 3 times. You will then have the product in the large dial, the multiplier in the small dial and the multiplicand on the machine, absolutely proving the calculation.

It costs nothing to try out the Marchant—write our nearest office for details of our free test proposition.

Marchant
Calculating Machine Co.
Oakland, Cal.
Dept. R 12

This Sander Will Blow Out a Stopped-Up Sand Pipe



The only positive track sander

This is the Reliance air sander, the only sander which is sure to put sand on your track. It is being used by such roads as the Chicago North Shore & Milwaukee, Michigan Railways, Milwaukee E. R. & L.

Here are some of its features: Prevents sand from being blown back into the car; can be removed without disconnecting any air line; can be regulated to give any amount of sand; sand hopper does not have to be placed over the wheels; no sand blast action to cut parts.

And will blow out mud or damp sand from the sand pipes, preventing the pipes from getting clogged, eliminating pull-ins to dig-out sand pipes. It absolutely assures your crew of sand when it is most needed.

When the motorman admits air to this sander part goes upward to force the plunger down, thus opening the valve and passing sand. Air also goes direct to the sand pipe and forces the sand to the track. But if the pipe is clogged the air pressure prevents the valve from opening and full brake line pressure is exerted to remove the obstruction. Further details in folder mailed on request.

1508 Fisher Bldg. **Holden & White** **Chicago, Ill.**

General Sales Agents for The Safety Appliance Company

ELECTRIC DAYLIGHT

With

Western Electric
DAVIS
FLOOD LAMPS

For emergency lighting—for construction work—wherever light is needed at night.

A portable, bright, glareless light that turns night into day.

It can be diffused over large areas or projected in single beam.

They can be used anywhere—no arc lamp trimming—no permanent wiring—write today for our Folder FL-17.

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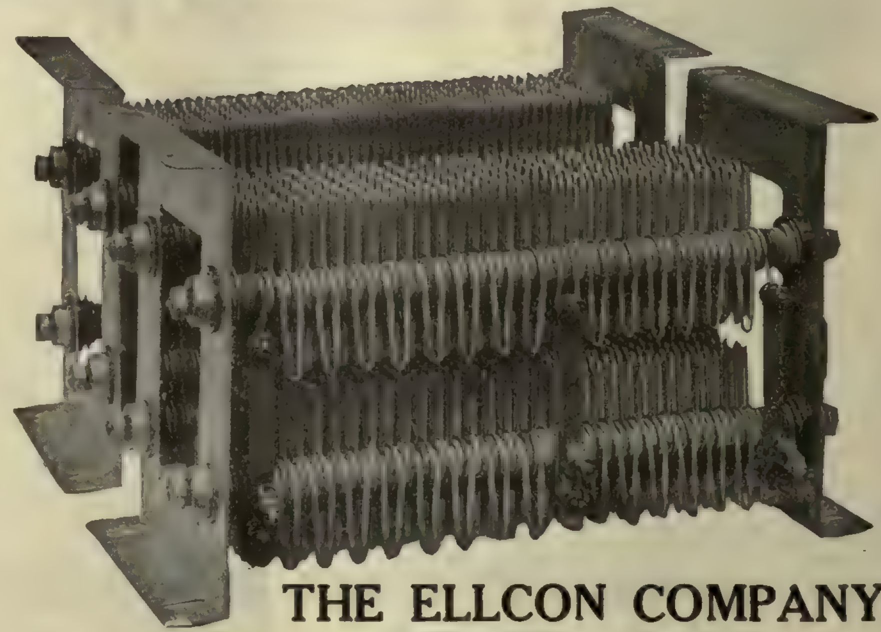
EQUIPMENT FOR EVERY ELECTRICAL NEED
Member Society for Electrical Development "Do it Electrically"

Less Weight—and Less Trouble—in

EMB Resistors

The *drawn* grids are much lighter than the cast grids used in ordinary resistors. They are never brittle, always uniform in cross-section, never strained by expansion and contraction due to rapid heating and cooling. They resist rust and corrosion better than cast grids.

And there are only about one-twenty-fifth as many joints as in resistors using cast grids. Our data sheet is informative.



THE ELLCON COMPANY
50 Church Street, New York

GEARS and PINIONS

possess the durability and easy running qualities which inevitably result from specialized gearing knowledge applied in a plant specially equipped for the production of gearing only.

All Grade *Treated* and Grade *Hardened* Van Dorn gearing carries a Brinell test voucher.

Let us quote.

THE VAN DORN & DUTTON CO.

Gear Specialists
Cleveland, Ohio, U. S. A.

The demand for our material is so great that we earnestly recommend our customers to anticipate their needs as much as possible.

STANDARD STEEL WORKS CO.
Morris Building Philadelphia

New York	Portland
Chicago	Havana, Cuba
St. Louis	London, Eng.
Pittsburgh	Melbourne, Aust.
San Francisco	Monterey, Mex.
Richmond	Mexico City

GRIFFIN
F. C. S.
WHEELS

are used on electric railways throughout the country.

Designed on scientific principles for braking power as well as load carried, they are giving splendid service in street and interurban electric railway service.

The chilled tread and flange surface containing three and one-half per cent carbon white iron gives an extremely hard surface capable of long wear.

Prompt Deliveries Assured

GRIFFIN WHEEL COMPANY
McCormick Building, Chicago, Ill.

FOUNDRIES
Chicago Detroit Boston Denver St. Paul Tacoma
Kansas City Los Angeles

These Thirty-three Foot Cars for Bangor Railway and Electric Co. Are Mounted on Our "Radial" Trucks

Formerly double trucks or maximum traction would have been necessary, and the weight would be from twelve to twenty-five per cent greater. The "Radial" Truck accomplishes these important reductions with no sacrifice of efficiency or good riding. Why carry the dead weight?

NO NOSING NO GALLOPING ANY WHEEL BASE REQUIRED

Philadelphia Holding Company, 505 Chestnut St., Philadelphia, Pa.

Recent shipment of semi-steel trailer cars for Salt Lake & Ogden Railway

THE JEWETT CAR COMPANY
Newark, Ohio

THE
CINCINNATI
CAR
COMPANY

WORKS:
WINTON PLACE
CINCINNATI, OHIO

The St. Louis
Car Company

QUALITY SHOPS

8000 N. Broadway
St. Louis

Where
a Pound of Prevention
is worth a Ton of Cure

And that extra pound or two pressure for the brakes may be all that stands between the motor man and some hideous accident.

You ought to insure it always being available for such emergencies by having your compressors equipped with

McQUAY-NORRIS
LEAK-PROOF
PISTON RINGS

They fit so accurately and have such firm and equal bearing power that they prevent leakage from cylinders, secure quick recharge of air and maintain proper pressure in the reservoir.

Leak-Proof Piston Rings are elastic, strong and durable. Their light tension saves power and undue wear on cylinders through friction or scoring.

A set of rings FREE for any air compressor test.

Write Department L

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McQuay-Norris Mfg. Co.
St. Louis, U. S. A.

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Western **"Good Poles Quick"** Northern

Quick Shipments
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Minneapolis Yard

Rooms 832-834, 72 West Adams St., Chicago, Ill.
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Butt Treating
Open Tank and
"Hot and Cold" Processes

MARSH & McLENNAN FIRE INSURANCE
Special Attention Given to Traction Insurance

Insurance Exchange, CHICAGO

19 Cedar St. NEW YORK
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300 Nicollet Ave. MINNEAPOLIS
Ford Bldg. DETROIT
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THESE OFFICES WILL GIVE YOU THE BEST THERE IS IN INSURANCE SERVICE

ALUMINUM
Railway Feeders
And all kinds of Electrical Conductors

Aluminum feeders are less than one-half the weight of copper feeders and are of equal conductivity and strength. If insulated wire or cable is required, high-grade insulation is guaranteed. Write for prices and full information.

Aluminum Company of America
Pittsburgh, Pa.

ELECTRICAL WIRES and CABLES OF EVERY DESCRIPTION

Aerial Cables
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Bare Copper Strands
Copper Wire Bare
Cambric Cables
Fixture Wire
Fire and Weatherproof Wire
Field Coils
Lamp Cord
Moving Picture Cord
Mining Machine Cables
Magnet Wire
Power Cable, Rubber Insulated
Power Cable, Cambric Insulated
Power Cable, Paper Insulated
Slow Burning Wire
Telephone Cable, Paper Insulation
Telephone Cable, Rubber Insulation
Weatherproof Wire

JOHN A. ROEBLING'S SONS COMPANY Trenton, N. J.

CUTS WOOD
PRESERVING BILLS
IN HALF
Write for booklet

The Barrett Company

NEW YORK
Branches in Principal Cities

POLES WESTERN CEDAR **PILING**
We brag about the SERVICE we give

B. J. CARNEY & CO.
E. B. BRANDE, Manager
819 Broad Street, Grinnell, Ia.
M. P. FLANNERY, Manager
Spokane, Wash.
WM. MULLER & CO., 1729 McCormick Bldg., Chicago.
Commit us to memory

TREATED POLES, CROSS ARMS, TIES, TIMBERS, PAVING BLOCKS
CAPACITY 100,000,000 FEET B. M. PER ANNUM
SEND FOR PAMPHLET
International Creosoting & Construction Co.
Address all communications to Office, Galveston, Texas
Works: Beaumont, Texas Texarkana, Texas

POLES
NORTHERN WHITE CEDAR WESTERN RED CEDAR
BUTT TREATING
PAGE & HILL CO.
MINNEAPOLIS, MINN.

F. D. BARTON & CO.
Rail or Cargo
Cedar Ties and Posts, Piling
SAGINAW, MICH.

Michigan Western
CEDAR POLES
POSTS, TIES AND PILING
We use C-A-Wood-Preserver in Treating
The Valentine-Clark Co.
General Office: Minneapolis, Minn.
Toledo, Ohio; Chicago, Ill.; Kansas City, Mo.; St. Maries, Idaho.

AETNA INSULATION LINE MATERIAL
Third Rail Insulators, Trolley Bases, Poles, Harps and Wheels, Bronze and Malleable Iron Frogs, Crossings, Section Insulators, Section Switches.
Albert & J. M. Anderson Mfg. Co.
289-93 A Street, Boston, Mass.
Established 1877.
Branches—New York, 135 B'way. Philadelphia, 429 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St. San Francisco, 613 Postal Telegraph Bldg. London, 48 Milton Street.

TOOLS
for all classes of electrical construction and repair work. Write for catalog.
Mathias Klein & Sons Canal Station 25 **Chicago**

SERVICE—

A much abused word that we interpret successfully.

We believe that "90% of all orders shipped same day received" is a good definition.

Try us on that requisition —NOW.

UNION ELECTRIC COMPANY
Electrical Headquarters
Terminal Warehouses Pittsburgh, Pa.

STEEL POLES For every pole purpose

Bates Steel Poles in use by the DES MOINES CITY RAILWAY, Des Moines, Iowa, U. S. A.

Strongest STEEL POLE of like weight in the world.
Best STEEL POLE in the world for electric railway trolley service.
Most artistic STEEL POLE in the world for any service.
We make the lowest prices.
We have constantly on hand about two thousand tons of steel and can make immediate shipments.
A full line of convenient malleable fittings.
Our steel pole TREATISE tells a big story, ask for it.

BATES EXPANDED STEEL TRUSS CO.
208 South La Salle St., Chicago, Ill., U. S. A.

Aristos "COPPERWELD"—Copper Clad Steel Wire—
Beats Solid Copper 40 Ways
Cheaper—Lighter—Stronger—Higher Elastic Limit—Costs less to Maintain
GET DATA
Made from the product of Copper Clad Steel Co. of Pittsburgh, Pa.

Western Sales Office
Steel Sales Corporation
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PAGE WOVEN WIRE FENCE CO.
Monessen, Pa.

Eastern Sales Office
Page Woven Wire Fence Co.
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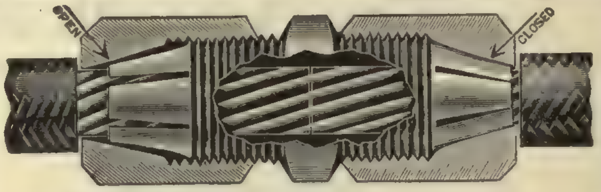

Make Splices Easy to Open Up, Too

All you need is a wrench to open up a splice or make it up again, if you use

FRANKEL SOLDERLESS CONNECTORS

Wonderfully simple; Mechanically and electrically strong. Withstand big overloads. Get our booklet.

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Transmission Line and Special Crossing Structures, Catenary Bridges
Write for our New Descriptive Catalog.
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It Meets Every Requirement—The Celebrated
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Patentees and Sole Manufacturers
Correspondence Solicited TRENTON, N. J.

DISPATCHER The Simmen System MOTORMAN
Direct Contact Between
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Write for Details
SIMMEN AUTOMATIC RAILWAY SIGNAL CO.
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Yes Sir! The USER confirms what we say re:

"ACME" (NESTABLE)
CULVERTS

Naturally WE are biased—but read this letter from the Tennessee County Engineer to whom this carload was shipped:

"The use of your 'ACME' pipe was in the nature of an experiment with us, as there has been very little used in this section, but I am glad to say it has been satisfactory and I will have no hesitancy in accepting it on an equal footing with the full-circle riveted pipe in the future."

There was *never* any doubt in *our* mind regarding the comparative merits of "ACMES." We have scores of references like this—only this happens to be the latest one. What we'd like is to move *you* to investigate for *yourself*.

"ACMES" are *usually* shipped *nested* to be hauled to and set up on the job (especially convenient in the larger diameters) but we ship them already Set-up, as illustrated above, where preferred. See our Catalog.

THE CANTON CULVERT & SILO CO.
MANUFACTURERS
CANTON, OHIO, U.S.A.

The Acetylene Blow Torch
Prest-O-Torch

Quicker and cheaper than a gasoline blow-torch for brazing and soldering

For factories, repair shops, linemen, dentists, jewelers, the Prest-O-Torch saves time and money. Used with Prest-O-Lite Tanks—ready made gas. Intense, concentrated flame instantly lighted. No depreciation, safe and convenient. Style "A," price, 75c (Canada, 85c) will braze up to ⅜ inch round rod. Style "C" for heavier work, $2.25 (Canada, $2.75). Special styles for dentists. Write for literature or send order now. Money refunded if not satisfied.

The Prest-O-Lite Co., Inc. 805 Speedway Indianapolis, Ind.
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7180

Buckeye Emergency Jack No. 239

An extra powerful and handy Jack for extra difficult jobs.

Forged Parts are Special Heat Treated

This Jack can be worked from many angles to load, yet full lifting power is available from any position. Write for catalog, details and price.

The Buckeye Mfg. Co.
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1

The Babcock & Wilcox Company
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WATER TUBE STEAM BOILERS
Steam Superheaters Mechanical Stokers

Works BARBERTON, OHIO—BAYONNE, N. J.

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Scale will not adhere firmly to boilers, no matter how bad the feed water if

DIXON'S BOILER GRAPHITE

is used. No other form of graphite fights the formation of scale so persistently and successfully. Booklet No. 108-T.

Made in Jersey City, N. J., by the
JOSEPH DIXON CRUCIBLE COMPANY
Established 1827 T-27

Foster Superheaters

Insure uniform superheat at temperature specified

Power Specialty Company
111 Broadway, New York City

Murphy Automatic Furnace

233

RAISES the possibility of efficient stoking to a maximum.

Write for catalog "C."

MURPHY IRON WORKS
Detroit, Mich. U.S.A.

FORD TRIBLOC

A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only Block that carries a five-year guarantee.

FORD CHAIN BLOCK & MFG. CO.
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AWARDED PANAMA PACIFIC INTERNATIONAL EXPOSITION GRAND PRIZE

American
Rail Bonds
Crown
United States
Twin Terminal
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Special Track Work
Built along quality lines to withstand long, severe service.

Switches,
Frogs, Crossings,
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New York Switch & Crossing Co.
Hoboken, New Jersey

Continuous Operation
of the
Power Plant

is a matter of extreme importance to the electric railway man. There must be no failure to supply the current when it is needed.

The constant use of Dearborn Treatment guarantees a high percentage of efficiency from the boilers. Made to suit the water conditions shown by analysis, it keeps the boilers free from scale, so that they steam freely and quickly, all corrosive or pitting action of the water is arrested, and, in fact, the boilers are in condition to yield their full quota of power constantly, while the fuel consumption is greatly reduced.

Send gallon of water for analysis, and let us advise regarding your plant requirements.

Dearborn Chemical Company
McCormick Building, Chicago

Oxweld Acetylene Co.
Largest Makers of Oxy-Acetylene Welding and Cutting Equipment in the World.
Originators of the Oxweld Process
Full information on all classes of Welding and Cutting will be sent on request.
Oxweld Acetylene Company
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HIGHEST QUALITY
TRACK SPECIAL WORK
HIGHEST QUALITY SAFETY DURABILITY FROGS CROSSINGS SWITCHES STANDS C F & C Co
WE MAKE THIS GRADE ONLY
CLEVELAND FROG & CROSSING CO.
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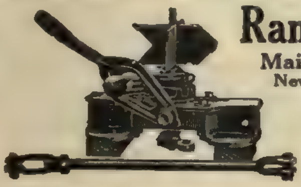

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Main Office, Hillburn, N. Y.
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Automatic Switch Stands,
T-Rail Special Work,
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PATENTED GECO APPLIANCES
GREEN CHAIN GRATE STOKERS
For Water Tube and Tubular Boilers
GREEN ENGINEERING CO.
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Bulletin No. 1—Green Chain Grate Stokers
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DISFICO
"WHALEBONE"
Fibre Track Insulation
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Elsmere, Del. Bridgeport, Penna. Chicago, Ill.

Kilby Frog & Switch Co.
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Tongue Switches, Mates, Frogs, Curves and Special Work of all kinds for Street Railways.

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Tested out, side by side, under any working conditions—with any other brand—our

VARNISHES

will prove their durability and maintenance of rated dielectric qualities. Our line includes a varnish for every condition met with in electric traction. Samples and prices on request.

Varnish Bulletin E. R. J. is a valuable addition to your technical data—write for it.

The Packard Electric Company
Warren, Ohio, U. S. A.

Do You Handle Your Ashes with *Only One Man?*

Reading Transit and Light Co.,
Reading, Pa.

The SKIP HOIST can be operated by a common laborer.

A pull on the rope causes the bucket to ascend, discharge and return *automatically.*

Write for prices on this device, also for catalog No. 20, an encyclopedia of all modern coal and ashes handling systems.

R. H. BEAUMONT CO.
111 S. 5th St., Philadelphia

STERLING
Insulating Varnishes and Compounds
HIGHEST GRADE STANDARD OF QUALITY

Clear and Black Air Drying Insulating Varnishes
Clear and Black Baking Insulating Varnishes
Oil Proof Finishing Varnishes
Impregnating Compounds
Wire Enamels

FOR THE MANUFACTURER—OPERATOR—REPAIRER

Inquiries invited. Catalogue on request.
We gladly assist in selection.

THE STERLING VARNISH COMPANY
PITTSBURGH, PENNA.
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Repair Shop Machinery and Cranes

Built by

NILES-BEMENT-POND CO.
111 Broadway, New York
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The Big Three
D & W Fuses, Deltabeston Wire Delta Tape
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STANDARD
Woven Fabric Co
Walpole, Mass.

KINNEAR Steel Rolling Doors
FOR CAR HOUSES

Compact, Durable, Easily and Speedily Operated and Fireproof. Openings of any size may be equipped and the doors motor-operated if desired. Manufactured by the
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BOSTON PHILADELPHIA CHICAGO

THE CUTTER ELECTRICAL AND MANUFACTURING CO. I-T-E CIRCUIT BREAKERS PHILADELPHIA

I. T. E.
Circuit Breakers

for heavy street railway work are the best obtainable. Write for New Complete Catalogue.

H. & K. No. 300-A

Slat Seat for City Service

An inexpensive, sturdy, sanitary seat. It has all the famous Hale & Kilburn features, such as Pressed Steel Pedestals, "Walkover" reversing mechanism and proper shaping of seat and back to make riding comfortable. Furnished in polished Maple, Birch, Cherry, Ash, Oak or Mahogany. The vertical slatting of the back not only affords more comfort than horizontal slatting but is also much handsomer.

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Hale and Kilburn Co.

Philadelphia New York Chicago
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No Overload

on your compressors when your car-doors are handled by

Consolidated Door Engines

—they automatically turn the air off when doors are in the open or closed position.

They can never pinch passengers, yet close the doors positively and quietly, and with a positive lock.

Ask us also about our systems of manual and electro-pneumatic door control.

100 Car Equipments of Consolidated Engines have recently been ordered by the Boston Elevated Railway, also 45 Equipments by the Long Island R. R.

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Johnson Registering Fare Boxes

used in connection with the car register increase receipts $1.00 per car, per day, counts metal tickets the same as cash thus giving a positive check on all class of fares.

WRITE FOR NEW BOOKLET

JOHNSON FARE BOX COMPANY

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Ventilation—Sanitation—Economy—Safety

All Combined in

THE COOPER FORCED VENTILATION HOT AIR HEATER

Patented September 30, 1913. Ask for the full story.

We Also Manufacture Pressed Steel Hot Water Heaters

THE COOPER HEATER CO., CARLISLE, PA.

The Standard for Speed, Accuracy, Durability

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Look for this
B-V.
Trade Mark

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Tool Company
124 Chambers Street
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Newark, N. J.

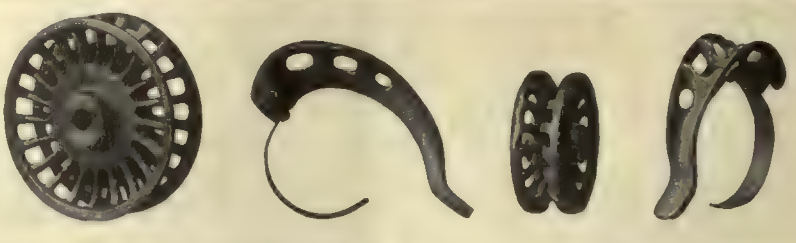
The Best Shade Rollers for Cars

SPECIAL shade rollers for cars, that will last and give satisfaction for years, and yet cost but little more than the poorest you can buy, are made by the Stewart Hartshorn Co., E. Newark, N. J. This company is by far the largest shade roller manufacturer in the world. It is able to give high quality at lower prices because of the enormous output. Write for catalog, stating wants. You are always protected when you buy shade rollers if they bear the signature Stewart Hartshorn

International Specialties Talk for Themselves

Money-counting fare boxes; Coin and metal ticket counting fare boxes; Coin registers; Coin and transfer registers; Coin, metal ticket and transfer registers; Motor-driven registers; Round and square registers; Badges; Punches and Bell cord.

THE INTERNATIONAL REGISTER CO.
15 South Throop St., Chicago

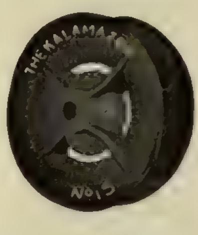


Nuttall Sleet Wheels and Scrapers

are an insurance against sleet storm troubles. Sizes for city and interurban service.

Wire your order now for shipment from stock.

NUTTALL **PITTSBURGH**



The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.

THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

This is the hub bearing of a HENSLEY Trolley Wheel after the rim is worn out.

HENSLEY Wheels require no bushing and maintain a perfect bearing in the hub until ready to be scrapped.

Our new catalog explains the merits of HENSLEY Wheels.

Our trial proposition proves these merits.

Hensley Trolley & Mfg. Co.
Detroit, Mich.

PANTASOTE

The National Standard for Car Curtains and Car Upholstery

AGASOTE HEADLINING

The only headlining made in one solid piece. Will not separate, warp or blister. Waterproof and homogeneous.

The Pantasote Company

11 Broadway, New York People's Gas Bldg., Chicago, Ill.
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WE CAN CUT YOUR COST OF HEATING CURRENT

WRITE FOR THERMOSTATIC CONTROL INFORMATION

GOLD

ELECTRIC HEATERS Cut Installation and Maintenance Charge.

VENTILATORS Also Ventilate in Stormy Weather.

THERMOSTATS Save Current.

ORIGINATED the use of **NON-CORROSIVE** Wire for Electric Car Heaters.

ORIGINATED The Ventilated Coil Support.

LET US FIGURE ON YOUR NEXT REQUIREMENTS

Gold Car Heating & Lighting Co., 17 Battery Pl., New York

The Eclipse Railway Supply Co.
CLEVELAND, OHIO

Manufacturers of the

ECLIPSE LIFE GUARD **ECLIPSE WHEELGUARD**
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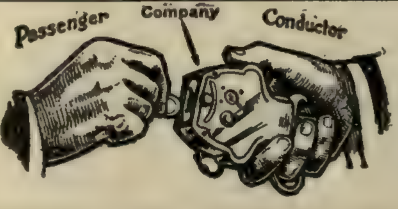
For the Answer to your Fare Collection Problems
Write for
"Earnings Per Passenger Mile"
It tells how the
BONHAM TRAFFIC RECORDER
Will Meet Your Needs
The Bonham Recorder Co., Hamilton, Ohio

Have you our new

Trolley Wheel Bulletin

Write for your copy

The Eureka Company **North East, Pa.**



Direct Automatic Registration By the Passenger

Rooke Automatic Register Co.
Providence, R. I.

ECONOMY
BUILT LIKE A WATCH
METERS

—the only means at your disposal to accurately measure the power consumption of cars. You can well afford to investigate. Bulletin 416.

Sangamo Electric Company
Springfield, Illinois

New York 50 Church St.
Rochester Mercantile Bldg.
Minneapolis Met'p'ltan Life Bldg.
Los Angeles San Fernando Bldg

"Frozen Air"

is preventable with denatured alcohol injection into the air brake system.

If you have been encountering serious troubles from this cause, do not permit this winter to go by without testing out our

RECTIFIER
AIR

National Safety Device & Mfg. Co.
2415 Smalley Court, Chicago, Ill.
Eastern Electric Railway Agent
LORD MANUFACTURING CO., NEW YORK

"Watch Your Step"

If it has
Universal Safety Tread
on it,
Proceed in Safety.
If Not,
Be Careful

Universal Safety Tread Co., Waltham, Mass.
New York Philadelphia Chicago

Saved from the Ashes as many tickets are, means nickels lost to you. Avoid the risk.

Patten Ticket Destroyer is used right in the office under the eyes of trustworthy employes.

It mutilates beyond redemption.

Scrap sold will pay for the machines.

Ask us for Circular J.

PAUL B. PATTEN CO.
78 Lafayette St., Salem, Mass., U. S. A.

ELECTRIC RAILWAY DEVICES

Rectifier for Frozen Air Pipes.
High Power Compact Hand Brakes, Gear or Differential Types.
Sterling Light Weight Roller Bearing Trolley Bases.
Screenless Air Cleaners for Compressors
Sterling Sand Boxes.
Berg Fenders and Wheel Guards.
Multi-Vapo-Gap Lightning. Arresters and Hydrogrounds.
Trigger Lock Reversible Controller Fingers.
"Q-P" Trolley Catchers.
Soldered Rail Bonds.
Friction and Insulating Tapes.
Sterling Ticket Punches.
Controller Handles.

LORD MFG. CO.,
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Bayonne
Car Roofing

Makes Cars Stay Young

—after it has made a car look right by sprucing up the exterior, it makes the car stay right by protecting the interior.

Bayonne treatment, applied to Bayonne close-woven special fabric, produces a roofing that gives maximum wear with minimum maintenance. Saves painting cost, too—only one color coat needed after installation.

Write for samples.

John Boyle & Co., Inc.
112-114 Duane St., New York, 70-72 Reade St.
Branch House, 202-204 Market St., St. Louis, Mo.

UNION SPRING & MFG. CO.

SPRINGS
COIL AND ELLIPTIC
M. C. B. Pressed Steel Journal Box Lids

General Office: First Nat'l Bank Bldg.
PITTSBURGH, PA.
Works: New Kensington, Pa.
50 Church St., New York. 1204 Fisher Bldg., Chicago, Ill.
Missouri Trust Bldg., St. Louis, Mo.

The "Hycap-Exide" Battery
for
STORAGE BATTERY STREET CARS
THE ELECTRIC STORAGE BATTERY CO
PHILADELPHIA

PROVIDENCE FENDERS
H-B LIFE GUARDS

The Consolidated Car Fender Co., Providence, R. I.
Manufacturers of The Providence Fender and H-B Life Guard
Wendell & MacDuffie Co., 61 Broadway, New York
General Sales Agents

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FOR SALE

We have located at Fort Worth, Texas, the following:

10,556 lbs. 400,000 C.M., B. & S., bare copper cable, on six (6) reels of approx. 1760 lbs. each.

46,616 lbs. 500,000 C.M., B. & S., bare copper cable, on twenty-three (23) reels of approx. 2025 lbs. each.

W. R. Kerschner Co., Inc.
50 Church St., New York City

IMMEDIATE SHIPMENT

400 Kilowatt 60 Cycle Rotary Converter

1—400 KW. Westinghouse, 3 ph., 60 cy., 370 v. A. C., 575 v. D. C., speed 600 revolutions.

200 Kilowatt 60 Cycle Rotary Converters

2—200 KW. Westinghouse, 3 ph., 60 cy. rotary converters, 370 v. A. C., 575 v. D. C., 720 rpm., with starting motors, also transformers if desired.

150 Kilowatt 60 Cycle Rotary Converters

2—150 KW. Westinghouse 3 phase, 60 cycle rotary converters, 550 volts, 273 amps., 720 r.p.m., complete with 4—100 KW. Westinghouse Scott connected oil insulated transformers, 10,000/9500 volts prim., 430/362 volts secy.

150 Kilowatt 25 Cycle Rotary Converters

2—150 KW. General Electric type T. C., 4-150-750, 25 cycle, 3 phase, 575 volt, rotary converters, 750 r.p.m., complete with end play and speed limit device.

Transformers

3—185 KVA. Gen. Elec., type A. C., 25 or 60 cycles, 2300 volts primary, 430 volts secondary.

4—125 KW. Westinghouse transformers, single phase, 60 cycles, 15,000 volts primary, 340/360 v. secondary.

4—100 KW. Westinghouse transformers, oil insulated, single ph., 60 cy., 2300 v. primary, 360 v. secondary.

4—100 KW. Westinghouse, oil insulated, Scott connected transformers, 10,000/9500 v. primary, 430/362 v. secondary.

3—75 KW. Westinghouse, oil insulated, 60 cycle, 6600 or 13,200 v. primary, 220 v. secondary.

Railway Motors

2—75 to 90 HP. Westinghouse No. 112 Railway Motors, newly rewound, practically new.

IMMEDIATE DELIVERY

ARCHER & BALDWIN
114-118 Liberty Street New York City
TELEPHONE 4337-4338 RECTOR

CARS FOR SALE

OPEN and CLOSED
MOTOR and TRAIL
Write for Price and Full Particulars to
ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

COMPLETE ARMATURES FOR SALE

FOR ALL THE STANDARD
STREET RAILWAY MOTORS
GET OUR PRICE WE CAN SAVE YOU MONEY
America's Greatest Repair Works
CLEVELAND ARMATURE WORKS, Cleveland, O.

Wanted Daily 100,000 Lbs.

CLEAN COPPER SCRAP
NEW BRASS CLIPPINGS
SHRAPNEL CASE SCRAP

CONSOLIDATED
ROLLING MILLS & FOUNDRIES CO. INC.
25 BROAD ST., NEW YORK CITY

MACGOVERN & COMPANY, Inc.

114 LIBERTY STREET NEW YORK CITY

Steam and Electrical Machinery

Air Compressors, Pumps, Hoists, etc.

Get Your Wants into the Searchlight

SEARCHLIGHT SECTION

Get your Wants into the Searchlight

ADVERTISING RATES

Under "Positions Wanted," including Salesmen looking for new connections, Evening Work Wanted, Side Line Wanted, etc., undisplayed advertisements cost **two cents a word,** minimum charge 50 cents an insertion, **payable in advance.**

Under "Positions Vacant," including Agents and Agencies Wanted, Representatives Wanted, Salesmen Wanted, Partners Wanted, Desk Room Wanted or For Rent, Business Opportunities, Employment Agencies, and Miscellaneous For Sale, For Rent, and Want ads; also Auction Notices, Receivers' Sales, Machinery and Plants For Sale or Wanted (with one line of display heading), undisplayed advertisements cost **three cents a word,** minimum charge $1.50 an insertion.

If replies are in care of any of our offices, allow five words for the address.

All advertisements for bids (Proposals) cost $2.40 an inch.

ADVERTISEMENTS IN DISPLAY TYPE

cost as follows for single insertions:

1/16 p. (1⅛x3⅜ ins.)	$5.00	1 in. (1x2 1/16 ins.)	$3.00
⅛ p. (2⅜x3⅜ ins.)	10.00	4 inches (4x2 1/16 ins.)	11.60
¼ p. (5x3⅜ or 2⅜x7 ins.)	20.00	8 inches (8x2 1/16 ins.)	22.40
½ p. (10¼x3⅜ or 5x7 ins.)	40.00	15 inches	40.50

1 page (10¼x7 ins.) 30 inches....$80.00

For space to be used within one year, to be divided to suit requirements of advertiser, provided some space is used in each issue following first insertion:

1 page	$80 a page	18 pages	$56 a page
3 pages	72 a page	26 pages	53 a page
6 pages	64 a page	40 pages	52 a page
12 pages	58 a page	52 pages	50 a page

In replying to advertisements, do NOT enclose original testimonials, drawings or photographs that you may want returned. Advertisements for men often produce several hundred applications and no employer can be expected to read all of these carefully and return the papers or applications of those in which he is not interested. State your experience and qualifications in as concise and neat a manner as possible and enclose COPIES of your testimonials.

When advertising machinery, use your own name and address—or a local address of some kind—so that the readers can wire direct and get quick replies. We advise also that you state in your advertisement the present location of plant that is offered for sale, or point of delivery provided you are in the market for equipment.

FOR SALE

Wire for Sale

Eight thousand pounds of No. 3 asbestos and single cotton covered magnet wire, manufactured by Electric Cable Co. On original reels and in perfect condition. If interested write W. H. Smaw, Pur. Agt. Georgia Ry. & Power Co., Atlanta, Ga.

Generating Set for Sale

1—300 hp. Buckeye tandem compound engine 14¼" and 25 x 21", 20" stroke, 200 r.p.m., non-condensing, capable of developing 35% in excess of this capacity, direct connected to a 3-phase, 200 kw., 60 cycle General Electric generator. This generating set is in good condition. Immediate shipment can be made. If interested, address Morden Frog & Crossing Works, 208 South La Salle Street, Chicago.

Armature Coils

3 Sets GE-1200 Railway Motor Armature coils. Catalog No. 18069. Immediate shipment. If interested address Hagerstown & Frederick Ry. Co., Terminal Bldg., Frederick, Md.

Stock Taking Time

Now is the time to turn the surplus stock of metals you have on hand into cash. We buy all grades of scrap metals, small lots as well as large lots. Write us today and tell us what you have and we will be pleased to quote you prices. National Metal & Rubber Company, 30-31 India Wharf, Boston, Mass.

For Sale

13,000 ft. 2/0 plain trolley wire.
8,000 ft. 4/0 plain feed wire.
25,000 ft. 4/0 triple braided feed wire.
1 Passenger Car.
1 Combination Baggage and Passenger Car.
Rails all sizes.
Henry A. Hitner's Sons Co., Station K, Philadelphia, Pa.

RAILS

400 Tons 60 lb.
650 Tons 58 lb.
100 Tons 56 lb.
1200 Tons 52 lb.
75 Tons 80 lb.
600 Tons 68 lb.
50 Tons Girder Rails
20 Tons Flat Rails

OR ANY SECTION—NEW OR RELAY

Before buying
LOCOS., CARS, EQUIPMENT, MACHINERY, TANKS
See what Bargains can be obtained from

ZELNICKER IN ST. LOUIS

428 First Nat. Bk., Chicago
910 Hennen Bldg., New Orleans

POSITIONS WANTED

ASSISTANT superintendent with city company operating 70 cars, desires position as superintendent or assistant to general manager. Twelve years' experience all departments. Box 1285, Elec. Ry. Jour.

GENERAL claim agent desires position with electric railway in the central or eastern portion of the United States. Special attention given to accident prevention work. Highest of references. Box 1284, Elec. Ry. Jour., 501 Rialto Bldg., San Francisco, Cal.

POSITION as General Superintendent, city and interurban system. Electrical Engineer with ten years' electrical, mechanical, investigation and operating experience on passenger and freight lines. Box 1279, Elec. Ry. Jour.

SUPERINTENDENT wants position as Transportation or General Freight and Passenger Agent, or both. Forty-eight years old. Twenty years' experience. Box 1262, Elec. Ry. Jour.

WANTED—Position as superintendent or assistant superintendent of an Electric Railway. Familiar with the operation of both city and interurban systems. Age 31 years. Box 1277, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

WANTED—General foreman or M.M. position by man with 15 years' experience in street railway business. Thoroughly up to date. Economical shop management and can get results. At present employed as general shop foreman. Highest references from present employers. Box 1278, Elec. Ry. Jour.

YOUNG man wants position as assistant to busy executive. Experienced in lighting field and intimate knowledge of electric railways through intensive research work. Practical, resourceful and energetic. Box 1283, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

Get your Wants into the Searchlight

POSITIONS WANTED

YOUNG man, six years in executive offices large Eastern street railway and lighting company. Now law clerk legal department. College graduate; member of bar. Can handle legal and claim work. Good assistant to busy executive. Box 1223, Elec. Ry. Jour., 935 Real Estate Trust Bldg., Philadelphia, Pa.

YOUNG man of high ambitions, good education, age 25, perfect health, familiar with railway, gas and electric accounting, desires an assistantship in auditing department of concern that can offer unlimited opportunity for advancement and promotion. Location immaterial; A-1 references as to character and ability. Box 1281, Elec. Ry. Jour., 935 Real Estate Trust Bldg., Philadelphia, Pa.

POSITIONS VACANT

A SMALL street railway company in New England States desires a capable working master mechanic. Sixteen passenger cars and four work cars. Pays twenty dollars. State full qualifications with references. P. O. Box 614, Greenfield, Mass.

ASSISTANT railway superintendent wanted for system operating twelve cars in Southwestern city of 25,000 people. Box 1255, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

EXPERIENCED cost and quotation clerk wanted, electrical supply house. State age, experience, salary. Box 1259, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

GENERAL superintendent wanted for 40 car city road; a man with practical experience and executive ability who has been successful in former positions. Give personal history and business experience. State salaries earned. Box 1256, Elec. Ry. Jour.

LARGE city and suburban property in Eastern Central States desires services of a master mechanic. Give personal history and salaries earned. Replies strictly confidential. Box 1282, Elec. Ry. Jour., 935 Real Estate Trust Bldg., Philadelphia, Pa.

SPECIAL track work draftsman wanted. State lowest salary. Address Chief Engineer, The Buda Company, Harvey, Ill.

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

More than 300 different products are here listed.

The Alphabetical Index (see eighth page following) gives the page number of each advertisement.

As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.

If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will promptly furnish the information.

Acetylene Apparatus. (See Cutting Apparatus, Oxy-Acetylene.)

Acetylene Service.
Oxweld Acetylene Co.
Prest-O-Lite Co., Inc.

Advertising, Street Car.
Collier, Inc., Barron G.

Air Cleaners.
Lord Mfg. Co.

Air Rectifiers.
Lord Mfg. Co.
National Safety Device Co.

Alloys and Bearing Metals. (See Bearings and Bearing Metals.)

Alloys, Steel and Iron.
Titanium Alloy Mfg. Co.

Anchors, Guy.
Electric Service Supplies Co.
Holden & White.
Ohio Brass Co.
Union Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Anti-Climbers.
Railway Improvement Co.

Automobiles and Buses.
Brill Co., The J. G.

Axle Straighteners.
Columbia M. W. & M. I. Co.

Axles, Car Wheel.
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Cincinnati Car Co.
St. Louis Car Co.
Standard Steel Works Co.
Westinghouse Elec. & M. Co.

Babbitting Devices.
Columbia M. W. & M. I. Co.

Badges and Buttons.
Electric Service Supplies Co.
International Register Co., The
Western Electric Co.

Bankers and Brokers.
National City Co.

Batteries, Dry.
Western Electric Co.

Batteries, Storage.
Electric Storage Battery Co.
Western Electric Co.

Bearings and Bearing Metals.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
More-Jones Brass & M. Co.
St. Louis Car Co.
Westinghouse Elec. & M. Co.

Bearings, Center.
Baldwin Locomotive Works.
Holden & White

Bearings, Roller and Ball.
Gurney Ball Bearing Co.
Railway Roller Bearing Co.

Bearings, Roller Side.
Holden & White.

Bells and Gongs.
Brill Co., The J. G.
Electric Service Supplies Co.
St. Louis Car Co.
Western Electric Co.

Benders, Rail.
Niles-Bement-Pond Co.
Western Electric Co.
Zelnicker Sup. Co., W. A.

Blow Torches for Soldering and Brazing. (See Cutting Apparatus, Oxy-Acetylene.)

Blowers.
General Electric Co.
Westinghouse Elec. & M. Co.

Boilers.
Babcock & Wilcox Co.

Boiler Cleaning Compounds.
Dearborn Chemical Co.

Bond Clips.
Electric Railway Improve. Co.

Bond Testers.
American Steel & Wire Co.

Bonding Apparatus.
Electric Railway Improve. Co.
Ohio Brass Co.
Oxweld Acetylene Co.
Prest-O-Lite Co., Inc.

Bonding Tools.
American Steel & Wire Co.
Electric Railway Improve. Co.
Electric Service Supplies Co.
Ohio Brass Co.

Bonds, Rail.
American Steel & Wire Co.
Electric Railway Improve. Co.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Union Electric Co.
Westinghouse Elec. & M. Co.

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Lincoln Bonding Co.

Book Publishers.
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel.
Niles-Bement-Pond Co.

Braces, Rail.
Kilby Frog & Switch Co.

Brackets and Cross Arms. (See also Poles, Ties, Posts, Etc.)
American Bridge Co.
Bates Expanded Steel Truss Co.
Electric Service Supplies Co.
Int'l Creosoting & Constr. Co.
Lindsley Bros. Co.
Ohio Brass Co.
Union Electric Co.
Western Electric Co.

Brake Adjusters.
Holden & White.
Smith-Ward Brake Co.

Brake Shoes.
Amer. Brake Shoe & Fdy. Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Long Co., E. G.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Holden & White
Long Co., E. G.
Lord Mfg. Co.
National Brake Co.
National Safety Device Co.
St. Louis Car Co.
Westinghouse Trac. B. Co.

Bridges and Buildings.
American Bridge Co.

Brooms, Track. Steel or Rattan.
Paxson Co., J. W.
Western Electric Co.
Zelnicker Sup. Co., W. A.

Brush Holders.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Brushes, Carbon.
Dixon Crucible Co., Jos.
General Electric Co.
Jeandron, W. J.
Morgan Crucible Co.
Western Electric Co.
Westinghouse Elec. & Mfg. Co.

Buckets, Grab.
Beaumont Co., R. H.

Bumpers, Car Seat.
Electric Service Supplies Co.

Bunkers, Coal.
American Bridge Co.
Beaumont Co., R. H.

Bunting.
Boyle & Co., Inc., John.

Bushings, Case Hardened and Manganese.
Bemis Car Truck Co.

Bushings, Fibre.
Diamond State Fibre Co.

Buttons. (See Badges and Buttons.)

Cables. (See Wires and Cables.)

Calculating Machines.
Morchant Calculating Machine Co.

Carbon Brushes. (See Brushes, Carbon.)

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc.—(See those headings.)

Car Trimmings. (For Curtains, Registers, Doors, Seats, etc., see those headings.)

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cincinnati Car Co.
Jewett Car Co.
Kuhlman Car Co., G. C.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Second Hand.
Electric Equipment Co.

Cars, Self-Propelled.
Electric Storage Battery Co.
General Electric Co.

Car Stops, Automatic.
Consolidated Car-Heating Co.

Castings, Brass.
Frankel Connector Co.
More-Jones Brass & M. Co.

Castings, Composition or Copper.
Anderson Mfg. Co., A. & J. M.

Castings, Gray Iron and Steel.
Amer. Brake Shoe & Fdry. Co.
American Bridge Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Long Co., E. G.
St. Louis Car Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.

Castings, Malleable and Brass.
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Long Co., E. G.
St. Louis Car Co.

Catchers and Retrievers, Trolley.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Holden & White.
Long Co., E. G.
Lord Mfg. Co.
Ohio Brass Co.
Union Electric Co.
Wood Co., Chas. N.

Ceiling, Car. (See Headlining.)

Chain and Belt Machinery.
Beaumont Co., R. H.

Charging Sets, Storage Battery.
General Electric Co.

Cheese Cloth.
Boyle & Co., Inc., John.

Chemists.
Little, Inc., Arthur D.

Circuit Breakers.
Cutter Electrical & Mfg. Co.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Clamps.
Frankel Connector Co.

Clamps and Connectors for Wires and Cables.
Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co.
Frankel Connector Co.
General Electric Co.
Klein & Sons, Mathias.
Ohio Brass Co.
Union Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Cleaners and Scrapers, Track. (See also Snow - Plows, Sweepers and Brooms.)
Brill Co., The J. G.
Cincinnati Car Co.
Ohio Brass Co.
Van Dorn & Dutton Co.
Western Electric Co.

Cleats, Car Wiring.
General Electric Co.

Clusters and Sockets.
General Electric Co.

Coal and Ash Handling. (See Conveying and Hoisting Machinery.)

Coasting Clocks.
Railway Improvement Co.

Coil Banding and Winding Machines.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Western Electric Co.

Coils, Armature & Field.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Independent Lamp & Wire Co.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coin-Counting Machines.
International Register Co., The
Johnson Fare Box Co.

Cooling Systems.
Spray Eng'g Co.

Commutator Slotters.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Wood Co., Chas. N.

Commutator Truing Devices.
General Electric Co.

Commutators or Parts.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
Western Electric Co.
Westinghouse Elec. & M. Co.

Is YOUR Capital Gathering Cobwebs?

It is if any of it is tied up in old field coils.

We can help you put these coils to work again. Send them to us and let us reconstruct them. We remove the old insulation—clean and anneal the copper—then reinsulate it with

SALAMANDER PURE ASBESTOS

which is, in itself, a guarantee against carbonization due to age and breakdown under overload. We then rewind the wire into new coils having just the same characteristics as the old ones.

It's *better* than selling your old coils—and *cheaper* than buying new ones, for our only charge is for the actual insulation used. Ask us to demonstrate the economy of our method.

Independent Lamp & Wire Co., Inc.

Offices: 1737 Broadway, New York

FACTORIES: York, Pa., and Weehawken, N. J.

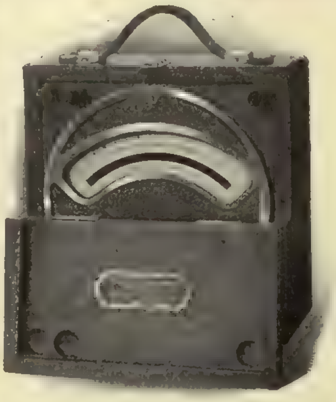
For General Testing

in Electric Power Plants, or for Outdoor Work

Weston

Model 45

D. C. Portable Ammeters and Voltmeters



Designed to meet the demand for a medium-priced Ammeter and Voltmeter. Their accuracy is guaranteed within 1 per cent.

They are shielded from the influence of external magnetic fields, the movement and magnetic system being enclosed in an iron case permanently mounted in a handsome wooden carrying box with hinged cover.

The scale has a mirror over which the knife-edge pointer travels. Readings can be made within 1/10 of a division at any part of the scale.

In mechanical and electrical workmanship the Weston Model 45 Portable Ammeters and Voltmeters practically attain perfection.

A full description will be found in Bulletin 501, which will be mailed to you on request.

Weston Electrical Instrument Co.

21 Weston Ave., Newark, N. J.

New York, Boston, Philadelphia, Richmond, Chicago, Buffalo, Cleveland, Cincinnati, Detroit, Pittsburgh, Denver, San Francisco, St. Louis, Toronto, Winnipeg, Vancouver, Montreal, Florence, Paris, London

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MANY SYSTEMS ARE USING TULC after first making most thorough tests under all conditions. Such tests have shown that it will cut lubrication costs in half.

THE UNIVERSAL LUBRICATING CO.
Schofield Building CLEVELAND, O.

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Barrett Track and Car Jacks
Barrett Emergency Car Jacks
Duff Ball Bearing Screw Jacks
Duff Motor Armature Lifts

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are made for every condition and requirement. M. C. B. Pin and Link, Car and Air, in all sizes and types.

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165 BROADWAY, NEW YORK CITY
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Chillingworth Seamless Gear Cases

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Eastern Agents for Union Fibre Co.
Southern and New England Agents for Thayer & Co.

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

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General Electric Co.
Westinghouse Trac. B. Co.

Condensers.
General Electric Co.
Westinghouse Elec. & M. Co.

Conduits.
Western Electric Co.

Connectors, Solderless.
Frankel Connector Co.

Controller Fingers.
Lord Mfg. Co.

Controller Handles.
Lord Mfg. Co.

Controller Regulators.
Electric Service Supplies Co.

Controllers or Parts.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Eureka Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Controlling Systems.
General Electric Co.
Westinghouse Elec. & M. Co.

Converters, Rotary.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Conveying and Hoisting Machinery.
American Bridge Co.
Beaumont Co., R. H.
Green Engrg. Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The.
Long Co., E. G.
Roebling's Sons Co., John A.
Samson Cordage Works.
Union Electric Co.

Cord Connectors and Couplers.
Electric Service Supplies Co.
Samson Cordage Works.
Wood Co., Chas. N.

Cotton Duck.
Boyle & Co., Inc., John.

Couplers, Car.
Brill Co., The J. G.
Cincinnati Car Co.
Long Co., E. G.
Ohio Brass Co.
Van Dorn Coupler Co.
Westinghouse Trac. B. Co.

Cranes. (See also Hoists.)
Beaumont Co., R. H.
Niles-Bement-Pond Co.
Van Dorn & Dutton Co.

Creosoting. (See Wood Preservatives.)

Cross Arms. (See Brackets.)

Crossing Foundations.
International Steel Tie Co.

Crossing Signals. (See Signals, Crossing.)

Crossings, Track. (See Track, Special Work.)

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American Rolling Mill Co.
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Delaware Metal Culvert Co.
Dixie Culvert & Metal Co.
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Illinois Corrugated Metal Co.
Independence Cor. Culvert Co.
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Lone Star Culvert Co.
Lyle Corrugated Culvert Co.
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Montana Culvert Co.
Nebraska Culvert & Mfg. Co.
Nevada Metal Mfg. Co.
New England Metal Cul. Co.
North East Metal Co.
Northwestern Sheet & I. Wks.
O'Neill Co., W. Q.
Ohio Corrugated Culvert Co.
Pennsylvania Metal Cul. Co.
Road Supply & Metal Co.
Sioux Falls Metal Cul. Co.
Spokane Corr. Cul. Co.
Tennessee Metal Culvert Co.
Utah Corr. Cul. & Flume Co.
Virginia Metal & Culvert Co.
Western Metal Mfg. Co.
Wyatt Mfg. Co.

Curtains and Curtain Fixtures.
Brill Co., The J. G.
Electric Service Supplies Co.
Hartshorn Company, Stewart.
Pantasote Co., The.
St. Louis Car Co.

Cutting Apparatus, Oxy-Acetylene.
Oxweld Acetylene Co.
Prest-O-Lite Co., Inc.

Derailing Devices. (See also Track Work.)
Cleveland Frog & Crossing Co.

Despatching Systems.
Simmen Automatic Ry. Sig. Co.

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Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Western Electric Co.

Detective Service.
Wisch Service, P. Edward.

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Consolidated Car-Heating Co.
National Pneumatic Co.

Doors and Door Fixtures.
Brill Co., The J. G.
General Electric Co.
Hale & Kilburn Co.

Doors & Shutters, Fireproof.
Kinnear Mfg. Co.

Doors, Folding Vestibule.
National Pneumatic Co.

Doors, Steel Rolling.
Kinnear Mfg. Co.

Draft Rigging. (See Couplers.)

Drills, Track.
American Steel & Wire Co.
Electric Service Supplies Co.
Long Co., E. G.
Niles-Bement-Pond Co.
Ohio Brass Co.
Union Electric Co.

Dryers, Sand.
Electric Service Supplies Co.
Union Electric Co.
Zelnicker Sup. Co., W. A.

Engineers, Consulting, Contracting and Operating.
Archbold-Brady Co.
Arnold Co., The.
Burch, E. P.
Byllesby & Co., Inc., H. M.
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Hunt & Co., Robert W.
Jackson, D. C. & Wm. B.
Little, Inc., Arthur D.
Richey, Albert S.
Roosevelt & Thompson.
Sanderson & Porter.
Scofield Engineering Co.
Stone & Webster Eng. Corp.
White Companies, J. G.
Woodmansee & Davidson, Inc.

Engines, Gas and Oil.
Westinghouse Elec. & M. Co.

Engines, Steam.
Westinghouse Elec. & M. Co.

Fare Boxes.
Brill Co., The J. G.
Cleveland Fare Box Co.
Internat'l Register Co., The.
Johnson Fare Box Co.

Fences and Fence Posts.
American Steel & Wire Co.

Fencing Wire.
American Steel & Wire Co.
Page Woven Wire Fence Co.

Fenders and Wheel Guards.
Brill Co., The J. G.
Cleveland Fare Box Co.
Cincinnati Car Co.
Consolidated Car Fender Co.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Lord Mfg. Co.
Star Brass Works.
Western Electric Co.

Fibre.
Diamond State Fibre Co.
Westinghouse Elec. & M. Co.

Fibre Insulation.
U. S. Metal & Mfg. Co.

Fibre Tubing.
Diamond State Fibre Co.
Westinghouse Elec. & M. Co.

Field Coils. (See Coils.)

Flooring Composition.
American Mason Safety Tread Co.
Western Electric Co.

Forgings.
Standard Steel Works Co.

Frogs, Track. (See Track Work.)

Furnaces. (See Stokers.)

Fuses and Fuse Boxes.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
Daum, A. F.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Fuses, Refillable.
Columbia M. W. & M. I. Co.
Economy Fuse & Mfg. Co.
General Electric Co.

Gaskets.
Diamond State Fibre Co.
Power Specialty Co.

Gas Producers.
Westinghouse Elec. & Mfg. Co.

Gates, Car.
Brill Co., The J. G.
Cincinnati Car Co.
Jewett Car Co.

Gages, Oil and Water.
Ohio Brass Co.

Gear Blanks.
Carnegie Steel Co.
Diamond State Fibre Co.
Standard Steel Works Co.

Gear Cases.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Union Electric Co.
U. S. Metal & Mfg. Co.
Westinghouse Elec. & M. Co.

Gears and Pinions.
Columbia M. W. & M. I. Co.
Diamond State Fibre Co.
Electric Service Supplies Co.
General Electric Co.
Long Co., E. G.
Nuttall Co., R. D.
Union Electric Co.
U. S. Metal & Mfg. Co.
Van Dorn & Dutton Co.

Generating Sets, Gas-Electric.
General Electric Co.

Generators, Alternating Current.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & Mfg. Co.

Generators, Direct Current.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & Mfg. Co.

Gongs. (See Bells and Gongs.)

Graphite.
Dixon Crucible Co., Joseph.
Morgan Crucible Co.

Greases. (See Lubricants.)

Grinders and Grinding Wheels.
Western Electric Co.

Grinders, Portable, Electric.
General Electric Co.
Railway Track-work Co.
Western Electric Co.

Guards, Cattle.
American Bridge Co.

Guards, Trolley.
Electric Service Supplies Co.
Ohio Brass Co.

Harps, Trolley.
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
Hensley Trolley & Mfg. Co.
More-Jones Brass & M. Co.
Nuttall Co., R. D.
Star Brass Works.
Western Electric Co.

Headlights.
Electric Service Supplies Co.
General Electric Co.
Long Co., E. G.
Ohio Brass Co.
St. Louis Car Co.
Union Electric Co.
Westinghouse Elec. & M. Co.

Headlining.
Pantasote Co., The.

Heaters, Car (Electric).
Consolidated Car-Heating Co.
Gold Car Heating & Lighting Co.
Smith Heater Co.

Heaters, Car, Hot Air.
Cooper Heater Co.
Smith Heater Co., Peter.

Heaters, Car, Hot Water.
Cooper Heater Co.
Smith Heater Co., Peter.

Heaters, Car, Stove.
Electric Service Supplies Co.
Smith Heater Co., Peter.

Hoists & Lifts.
Beaumont Co., R. H.
Duff Mfg. Co.
Ford Chain Block & Mfg. Co.
Niles-Bement-Pond Co.
Patten Co., Paul B.
Van Dorn & Dutton Co.

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Ohio Brass Co.

Hose, Pneumatic and Fire.
Johns-Manville Co., H. W.

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Niles-Bement-Pond Co.

Hydrogrounds.
Lord Mfg. Co.

WHAT
"Imperial" Tampers
DID FOR
The United Traction Co.
Albany, N. Y.

"Imperial" Pneumatic Tampers

Reduced the cost of tamping from $.22 per tie, for hand work, to $.065 per tie.

Enabled two laborers to tamp 180 ties per day.

Allowed the transfer of ten laborers from the tamping gang to other work.

Eliminated indifferent and uneven hand tamping.

Effected, when fitted with special picks, excellent results in breaking up the concrete base.

All at a total cost of $10.896 per day, including the wages of four men.

The electric railways which have adopted "Imperial" Pneumatic Tampers have secured better riding and more permanent roadbed at a much lower cost. Then, too, by replacing men with machines, they have solved the labor shortage problem.

You will need "Imperial" Tampers when the season opens. To insure delivery in time for early spring work, your order should be placed immediately.

Bulletin 9023 Describes "Imperial" Tie Tampers and Portable Compressors.

INGERSOLL-RAND COMPANY

11 Broadway, New York Offices the World Over 165 Q. Victoria St., London

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READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Inspection.
Electrical Testing Lab's., Inc.
Hunt & Co., Robt. W.

Instruments, Measuring, Testing and Recording.
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Sangamo Electric Co.
Western Electric Co.
Westinghouse Elec. & Mfg. Co.
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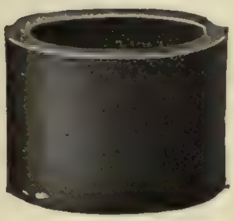

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Printing begins on Tuesday of each week.

Changes of copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for OK before publication.

New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.

If proofs before printing are required, change of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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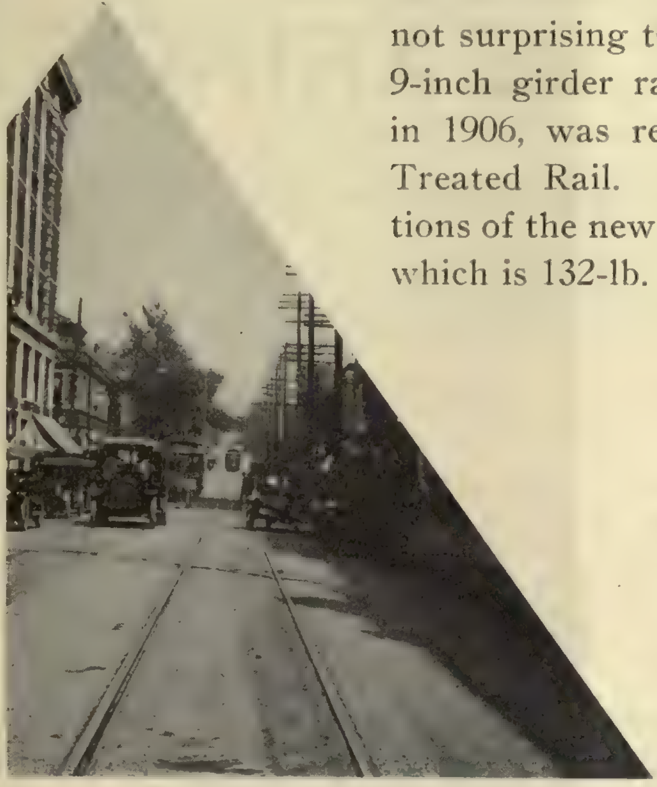
TITANIUM-TREATED RAIL

Carries 365,000 Cars per Year on Olive Street, St. Louis

Each track on this street of heavy traffic carries a daily total of 1000 cars, the average weight per car being 45,000 lb.

Titanium-Treated Rail has been in service in St. Louis since 1912, so it is not surprising that last year the 112-lb. 9-inch girder rail, laid in Olive Street in 1906, was replaced with Titanium-Treated Rail. Here are the specifications of the new Titanium-Treated Rail, which is 132-lb. Lorain Section 440:

Carbon	0.70 to 0.85
Silicon not over	0.20
Phosphorus not over	0.04
Manganese	0.60 to 0.90



To insure a flawless, long-lived rail, be sure to write Titanium-treatment into **your** rail specifications.

TITANIUM ALLOY MANUFACTURING COMPANY

Operating Under Rossi Patents

Processes and Products Patented

General Office and Works:
Niagara Falls, N. Y.

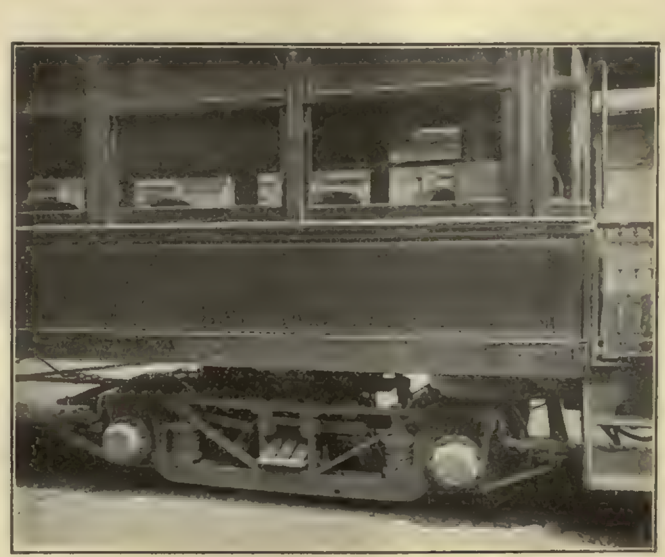
TPC
Reg. U. S. Pat. Off.
TRADE MARK.

Pittsburgh Office: Oliver Building
Chicago Office: Peoples Gas Building

New York Office: 15 Wall Street

AGENTS:

Pacific Coast: ECCLES & SMITH CO., Los Angeles, San Francisco, Portland
Great Britain and Europe: T. ROWLANDS & CO., Sheffield, England



VIEW OF TRUCK EQUIPPED WITH ROLLER BEARINGS

ROLLWAY BEARINGS

An Illuminating Summary

"Summing up the situation in regard to roller bearings, some of the advantages of their use may be enumerated as follows: Decrease of power, especially at peaks and during acceleration; more coasting; low lubrication and maintenance costs; reduced axle fractures; reduced pull-ins; fewer cars needed, reducing the investment, and possible adoption of smaller motors, and, therefore, less waste.

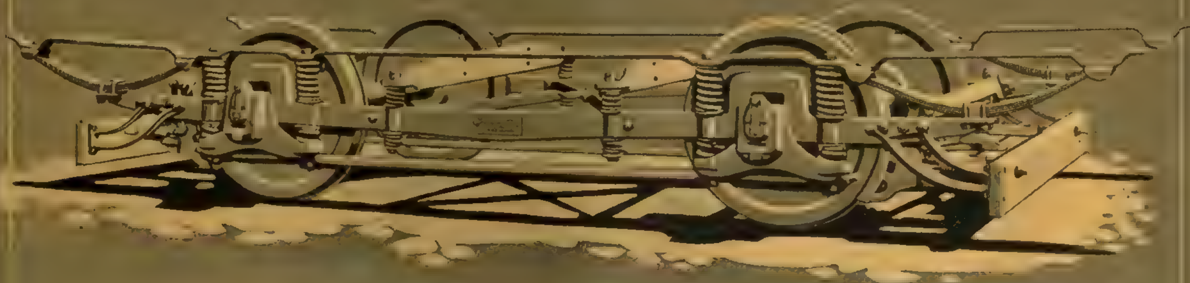
"The reduced energy demand means, in addition, wear on trolley wire and trolley wheels. With bearings of the anti-friction type, the axles are kept in the exact alignment, while with plain bearings there is considerable lost motion due to journal brass movement in the journal boxes, and to the ends of the journal being pushed to one side of the journal brass. With the anti-friction bearings there is also a reduction in brakeshoe and wheel wear. A car equipped with these bearings will coast further than one with plain bearings, and will accelerate at a higher rate with the same current."

(From an article entitled "Results Obtained with Roller Bearings on Interurban Cars" by W. B. Voth and A. C. Metcalfe, respectively Chief Engineer and Master Mechanic Empire United Railways, Inc., Syracuse, N. Y.)

Think it over

The Railway Roller Bearing Co.
SYRACUSE, N. Y.

BRILL



21-E TRUCK

FOR more than twenty years the Brill 21-E Truck has not been changed in any essential feature and, in spite of being operated on more electric railways at home and abroad than any other one type, remains the same today as when first introduced. A unique history. The two features that have been added during all these years, although not essential to safe operation and easy riding, are very marked improvements—the Brill "Half-Ball" Brake Hanger and the Brill Wide-Wing Journal Box.

THE J. G. BRILL COMPANY
Philadelphia, Pa.
AMERICAN CAR COMPANY
St. Louis, Mo.
G. C. KUHLMAN CAR CO.
Cleveland, Ohio
WASON MFG. COMPANY
Springfield, Mass.

Over 15,000
C P Compressors

OVER 15,000
CP COMPRESSORS

are now in service.

The results: reduced maintenance costs and greater reliability of air brake equipments are known to most everyone in the railway industry.

The CP type of compressor is the standard of excellence for all classes of electric railway service.

6461

General Electric Company

General Offices:
Schenectady, N. Y.

Sales Offices
in all large cities

Edw. J. Cook Describes the New Rochester Car

ELECTRIC RAILWAY JOURNAL

New York, December 16, 1916 McGraw Publishing Co. Inc. Vol. 48, No. 25 10c a copy

THE Terre Haute, Indianapolis & Eastern Traction Company welds together two 30-ft. sections of 6-in. channel steel for reinforcing underframes of interurban cars, instead of using 60-ft. lengths, which require special rolling at mills, cost more and must be shipped on two flat cars at extra cost.

In electric railway shops, yards and on the track there are hundreds of profitable applications to be found for oxy-acetylene welding, in both repair and construction work. Urgent repairs, many of them possible by no other welding process, are handled by the Prest-O-Lite Process, quickly, efficiently and at least cost. The outfit is really portable—ready at a moment's notice to be rushed to various jobs and repairs made right "on the spot," without the usual dismantling.

In the manufacture of certain new electric railway equipment this same process is of decided value; also universally employed in the application of Gas-Weld rail bonds.

Write for illustrated literature and engineering data on work accomplished by the Prest-O-Lite Process,

The Prest-O-Lite Co., Inc., 805 Speedway, Indianapolis, Ind.

World's Largest Makers of Dissolved Acetylene

Westinghouse

№ 514

40 Horsepower

Our Standard

For All-Round City Service

Originally built for 24-inch wheel, low-floor cars. Now suitable for all around city and light suburban service with 24-inch up to 33-inch wheels with standard A.E.R.A. axles. The Pittsburgh Railways Company is placing over 700 of these motors in service.

No. 514 represents the highest development in the railway motor art. Every refinement and modern improvement are embodied in its design. It is the lightest weight 40 h.p. motor ever built.

W
WESTINGHOUSE
ELECTRIC

Westinghouse Electric & Manufacturing Company

East Pittsburgh, Pa.

Atlanta, Ga.
Baltimore, Md.
Birmingham, Ala.
Bluefield, W. Va.
Boston, Mass.
Buffalo, N. Y.
Butte, Mont.
Charleston, W. Va.
Charlotte, N. C.
Chicago, Ill.
Cincinnati, Ohio
Cleveland, Ohio
Columbus, Ohio
*Dallas, Texas
Dayton, Ohio
Denver, Colo.
Des Moines, Iowa
Detroit, Mich.
*El Paso, Texas
*Houston, Texas
Indianapolis, Ind.
Joplin, Mo.
Kansas City, Mo.
Louisville, Ky.
Los Angeles, Cal.
Memphis, Tenn.
Milwaukee, Wis.
Minneapolis, Minn.
New Orleans, La.
New York, N. Y.
Omaha, Neb.
Philadelphia, Pa.
Pittsburgh, Pa.
Portland, Ore.
Rochester, N. Y.
St. Louis, Mo.
Salt Lake City, Utah
San Francisco, Cal.
Seattle, Wash.
Syracuse, N. Y.
Toledo, Ohio
Washington, D. C.
*W. E. & M. Co. of Texas.

500

ELECTRIC RAILWAY JOURNAL

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Circulation of this issue 7250 copies

"Write a letter to the WESTINGHOUSE TRACTION BRAKE COMPANY and tell them why we signed their contract."
TRADE

The Finished Letter

Somewhere in United States,
Sometime in 1916.

Westinghouse Traction Brake Co.,
Wildmerding, Penna.

Gentlemen:-

I return herewith in duplicate your air brake contract duly signed. My reason for executing this contract is that your equipment on our road has outlasted all others. I lay this remarkable record to the use of good materials, superior workmanship, also the valuable service rendered by your Inspector-Specialist who calls on us regularly and sees that we keep out of trouble.

Very truly yours
J B Miner
General Manager.

This is one of a number of Westinghouse Air Compressors installed in June 1907, having made approximately 960000 miles, costing little for repairs, and is still running strong and efficiently. Best materials, superior workmanship and Inspector-Specialist Service did it.

Westinghouse Traction Brake Company

General Offices: Wilmerding, Pa.

PITTSBURGH
Westinghouse Building
CHICAGO
Railway Exchange Building

NEW YORK
City Investing Building
ST. LOUIS
Boatmen's Bank Building

Four Westinghouse 1800 KW., 60 Cycle Railway Converters
Taggert St. Substation, Pittsburgh Railways Co.

WESTINGHOUSE ELECTRIC

When the Pittsburgh Railways Company decided upon the construction of their Taggert St. substation, they selected

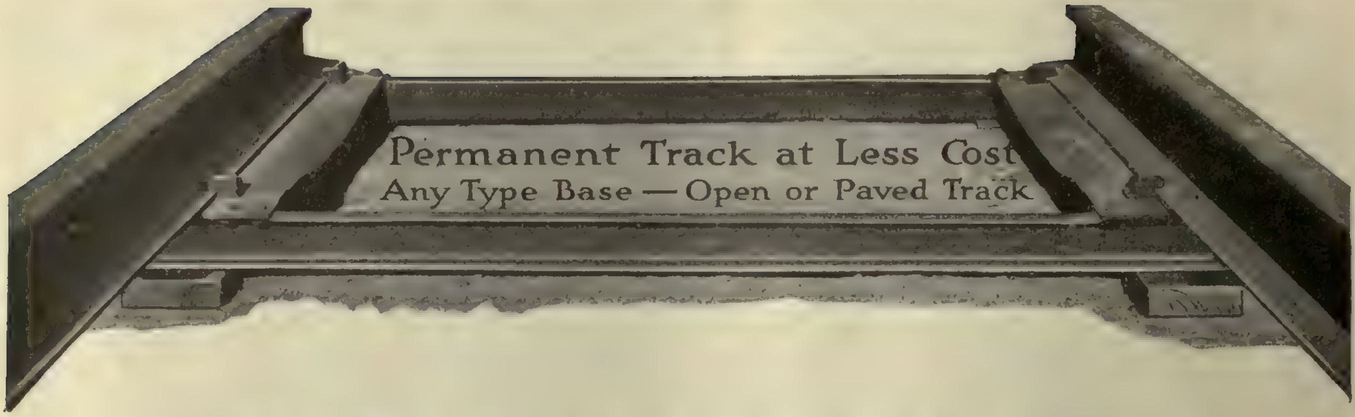
Westinghouse Rotary Converters

the acknowledged standards of efficiency in rotary converter operation.

The great operating economy obtained in this station results unquestionably from the selection of apparatus of proven superiority, in combination with a correctly designed substation building.

Westinghouse Electric & Mfg. Company
East Pittsburgh, Pa.
Sales Offices in All Large American Cities

Westinghouse


Permanent Track at Less Cost
Any Type Base — Open or Paved Track

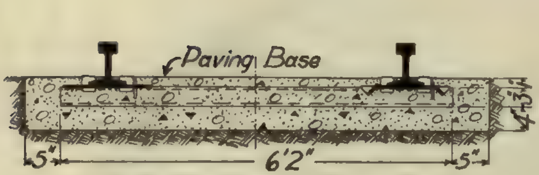
INTERNATIONAL

STEEL TWIN TIES

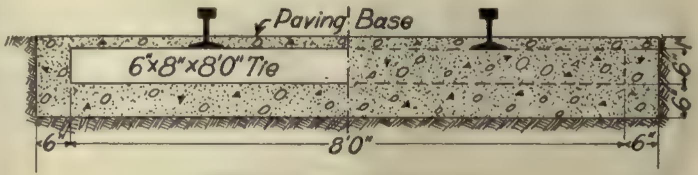
33% to 45% Saved in Construction Materials

First in blocking to grade and line. Three wood ties require six blocks. An International Steel Twin Tie requires only four blocks—a saving of 33 1/3% in blocking!

Look at the concrete required for the two track sections below—



International Steel Tie Construction



Standard Wood Tie Construction

The wood tie construction requires 1495 cubic yards of concrete per mile of track. International Tie construction, because of the shallow foundation, requires only 790 cubic yards of concrete per mile of track. There's a 48% saving in concrete for foundation or ballast, with 7 inches instead of only 6 inches of effective bearing material beneath the tie.

Another saving—2 feet less paving has to be put back because International Ties require an excavation of only 7 feet wide as against 9 feet for wood tie construction. There's at least 20% saving in repaving.

And bear in mind you are getting about 50% more speed all the time—delays are eliminated—everything goes forward on schedule.

If you don't believe it ask the man who has used International Steel Twin Ties.

Let us submit comparative estimates for your job.

The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations

General Sales Office and Works: Cleveland, Ohio

REPRESENTATIVES:

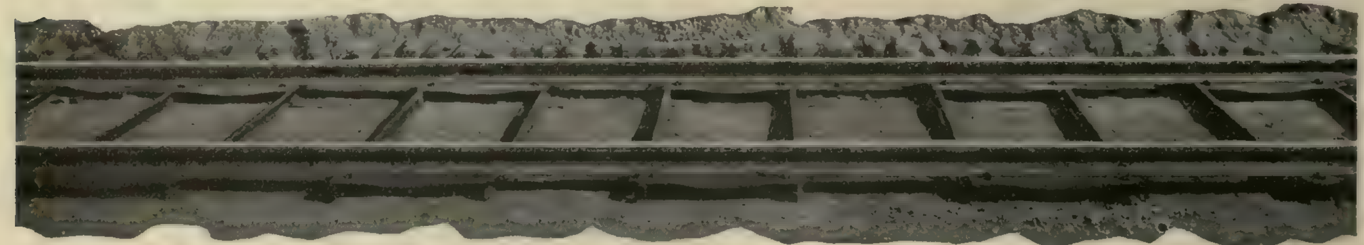
Western Eng'g Sales Co., San Francisco, Cal.
Los Angeles, Cal. Seattle, Wash.

R. J. Cooper Co.,
Salt Lake City, Utah.

J. E. Lewis & Co.,
Dallas, Texas.

Maurice Joy,
Philadelphia.

William H. Ziegler,
Minneapolis, Minn.



Making Good in a Hard Place

The trailer on a sixteen per cent grade, the motor car on level track, an abrupt angle where the grade changes, and O-B Tomlinson Couplers are holding the cars together.

Tomlinson Couplers are supported by Spring Draw Bar Carriers which absorb such inequalities of the track and take the strain off the cars.

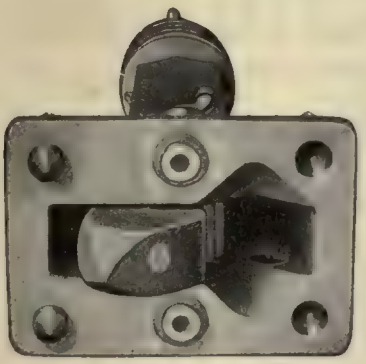
Also their method of mounting permits of operation around short curves.

There are various types of O-B Tomlinson Couplers to take care of as many conditions.

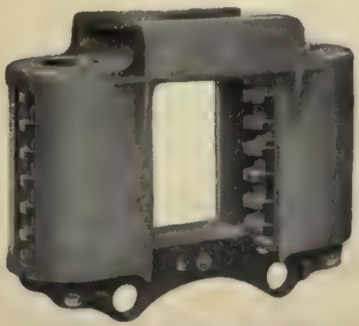
Send for further details.

The Ohio Brass Company

Mansfield, Ohio



O-B Tomlinson Form 8 Air Connecting Coupler
(Patented)

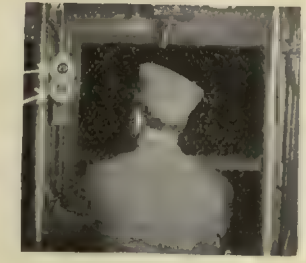


Spring Draw Bar Carrier
(Patented)

SUBSTANTIAL CONSTRUCTION

of RAMP and CONTACT SHOE

ASSURE POSITIVE ACTION OF CAB SIGNALS WITH THE SIMMEN SYSTEM



Many people suppose that a system which will enable the train dispatcher to control a signal in the cab of the motorman at every block must be very complicated. In fact it is only necessary for the contact shoe on the car to make at the entrance to each block *one* contact with a ramp rail which is connected by one wire to the dispatcher's office.

In order to make that one contact absolutely certain we make the ramp 70 feet long and of heavy angle iron. It is supported by strong insulating brackets. It is set edge-up so that the revolving shoe will scrape off sleet or snow. The shoe is mounted substantially on the truck and thoroughly protected from the weather. The contact is positive, the signal unmistakable. A broken wire gives a danger signal automatically.

After the car leaves the ramp the indication is held until the next ramp is reached. No chance to forget or misinterpret. No chance to miss a signal. The dispatcher's order—in red or green—is always before the motorman's eyes. Let us tell you more about the Simmen System.

SIMMEN AUTOMATIC RAILWAY SIGNAL CO.

1575 Niagara Street, Buffalo, N. Y.

Pacific Coast Representative: W. H. Crawford, 609 Spalding Bldg., Portland, Oregon

"BPR"

—not the initials of a railway, but the symbol of a thought close to the hearts of all railway men: "Better Public Relations."

How to *gain*, and *hold*, the confidence, yes, the friendship and co-operation of the public—

To some, it seems a knotty problem, yet it's really very simple—

It's merely a matter of *schedules*, *speed* and *safety*—these three.

And the greatest of these is *safety*.

United States Electric Signals wed *safety* with *speed*—they will pay their own cost in operating economies *alone*.

They are a mighty force in promoting better public relations.

Remember that the only exclusively electric railway signal factory in this country is always at your service—ready to solve your problems.

United States Electric Signal Company

West Newton, Massachusetts

Representatives:

Western: Frank F. Bodler, Monadnock Bldg., San Francisco
Chicago: Warren Moore Osborn, McCormick Bldg.
Foreign: Forest City Electric Service Supply Company, Salford, Eng.

Phono-Electric

The Trolley Wire of Long Life Despite a 14-Inch Offset

The Union Railway of the Bronx, New York, furnishes the latest record of extraordinary wear under extraordinary conditions.

On Westchester Avenue between Kelly Street and a point 200 feet east of Prospect Avenue the tracks are laid on a 4 per cent grade. The elevated railway structure makes it necessary to offset the wire 14 inches in order for the pole to clear the springs of the trolley base.

Despite these adverse conditions the same 4/0 Phono-Electric Trolley Wire that was installed in 1908 is still taking the "side-climb" and ever-changing torsion from trolley wheels offset 14 in.—at a rate, at times, of two per minute.

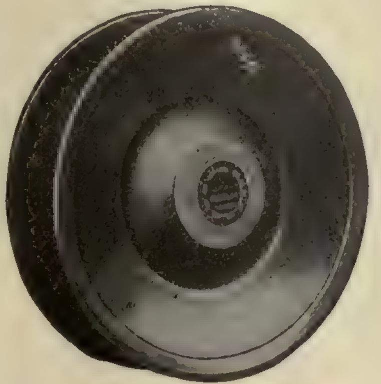
In these eight years the wire had but six visits from the repair truck. Only one break was due to car operation; the other five to fouling by high vehicles. That shows how well Phono-Electric stood the gaff.

The copper wire that preceded Phono-Electric on Westchester Avenue often broke within a week after installation.

Where you can't change conditions, change the wire to Phono-Electric.

Bridgeport Brass Company, Bridgeport, Conn.

Nuttall Wheels, Harps, Poles and Bases
Each the Best in Railway Service



There is such a thing as making trolley pole equipment so good that it may truthfully be classed as "best" for its particular service.

This "holds good" with Nuttall equipment, because every part making up the entire equipment is designed for much harder and much rougher service than the usual requirements demand.

These wheels, harps, poles and bases are all designed with reserve strength and are manufactured with great accuracy and care to make possible the extra long life which they offer.

Write us for catalogs

Eastern Agents for Nuttall

Electric Service Supplies Co.
Railway Material and Electrical Supplies
PHILADELPHIA 17th and Cambria Streets
NEW YORK 50 Church Street
CHICAGO Monadnock Building

GARLAND EXHAUST TYPE HONEYCOMB VENTILATORS

For Arch Roof Cars

Here are some of the reasons why this type of Garland Ventilator is being used so extensively on arched roof cars.

It will actually pull a greater amount of unhealthful air out of a stuffy car body, at a given car speed, than any similar ventilator on the market. The Garland Ventilator Company will prove this by anemometer tests for any railroad contemplating a study of ventilating problems.

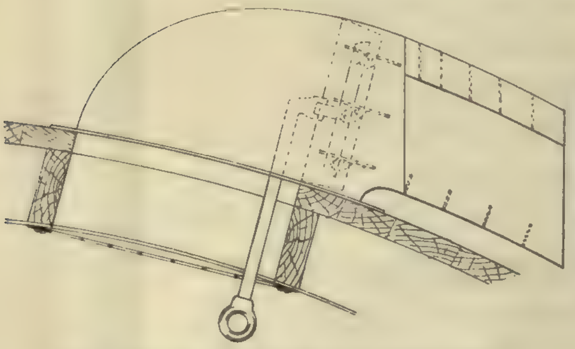
This maximum efficiency is gained by the patented feature of cowls which direct the air currents over the top opening and thereby create a vacuum in the exhaust duct.

This ventilator is not simply an opening in the roof, but has a definite and positive action.

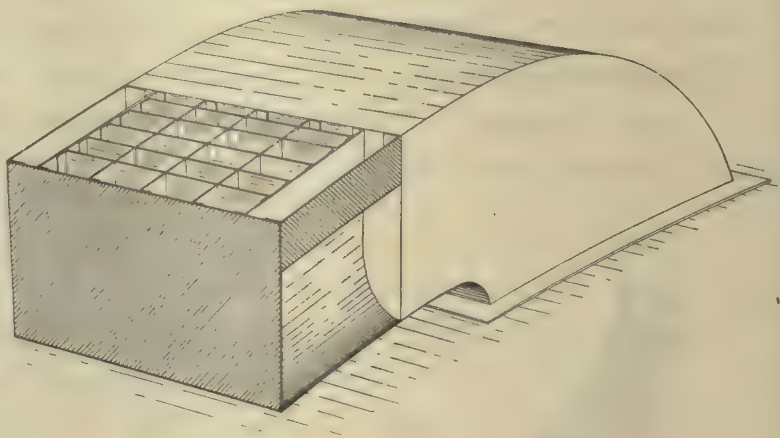
It is storm and wind proof. Rain and snow cannot enter the car body, and side winds, with the car standing, do not blow in. Consequently there are no annoying drafts.

The device for closing this ventilator is patented by Mr. T. H. Garland and is far superior to the ordinary register, which collects dust, dirt and water when closed, and then drops it on passengers underneath when it is opened. The Garland arrangement, as shown in the cross section below, does not allow dirt or water to pass through it into the car body.

Consider your ventilation NOW. Do not wait. Let us submit details of types for various kinds of service.



Cross Section of Car Roof and Ventilator



Holden & White

Electric Railway Sales Distributors for The Garland Ventilator Company

1508 Fisher Building, Chicago

U. S. Metal & Mfg. Co., New York and Washington; C. F. Saenger & Co., Cleveland; Brown & Hall Supply Co., St. Louis; C. E. A. Carr Co., Toronto; W. M. McClintock, St. Paul; Alfred Connor, Denver; O. H. Davidson Equipment Co., Salt Lake City; F. F. Bodler, San Francisco; S. I. Wailes, Los Angeles; W. F. McKenney, Portland, Ore.

Overhead construction in the Butte (Mont.) yards of the *Chicago, Milwaukee & St. Paul Railway;* 3000 volt direct current electrification, supported by *Western Red Cedar Poles.*

There are three facts about the **electrification** of the mountain divisions of the **Chicago, Milwaukee & St. Paul Railway** well worth keeping in mind.

1. This tremendous electrification of a trunk line stands out as one of the greatest pieces of work ever done in the electrical industry.

2. It established a notable record in thorough and efficient construction at low cost.

3. In this great piece of construction built for hard service for many years to come the engineers wisely used

Western Red Cedar Poles

They Carry the Heavy Load They Stand the Strain
The Most Beautiful of All Poles

Western Red Cedar Association

Peyton Building Spokane, Washington

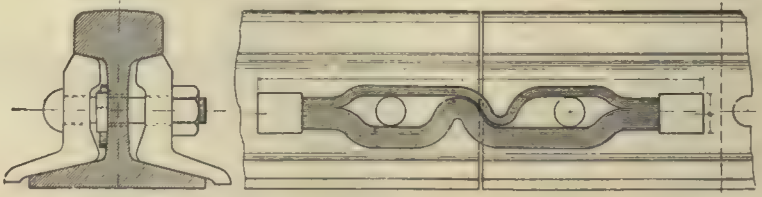
Electric Percolator!

Handy for the bonding gang but expensive for the stockholders.

We can prove to you that the bond under this fish-plate is not an

Erico Welded Bond

Yes, we make bonds to go underneath the plates.



The Electric Railway Improvement Co.
Cleveland, Ohio

Aisquith Street, Baltimore, paved 72 feet wide with Wire-Cut Lug Brick. Note perfect track paving

Wire-Cut Lug Brick Pavement Is Durable

FROM BULLETIN No. 23
U. S. Department *of* Agriculture

> "The life of a well constructed brick pavement can not be estimated with any great degree of exactness; first, because no brick pavement which has been constructed in accordance with the best modern practice has yet worn out. The amounts of wear sustained by given pavements during comparatively long periods of years have been determined in several instances, but have usually been so small as to make the problem of terms of service appear almost indefinite. It is evident, however, that in order to secure the full benefit of this excellent resistance to wear the surface of the pavement must not be permitted to become uneven because of the failure of isolated bricks."

Read this extract from Bulletin No. 23, U. S. Department of Agriculture—and remember that no isolated brick in a Wire-Cut Lug Brick pavement has a possible chance to fail, if construction is right.

The Wire-Cut Lug construction definitely assures just the right gap for grouting between all bricks, and a strong bond, thus making the pavement a true monolith.

The wire-cutting conserves the full strength of the clay—prevents laminations—gives homogeneous brick of the most durable wearing quality.

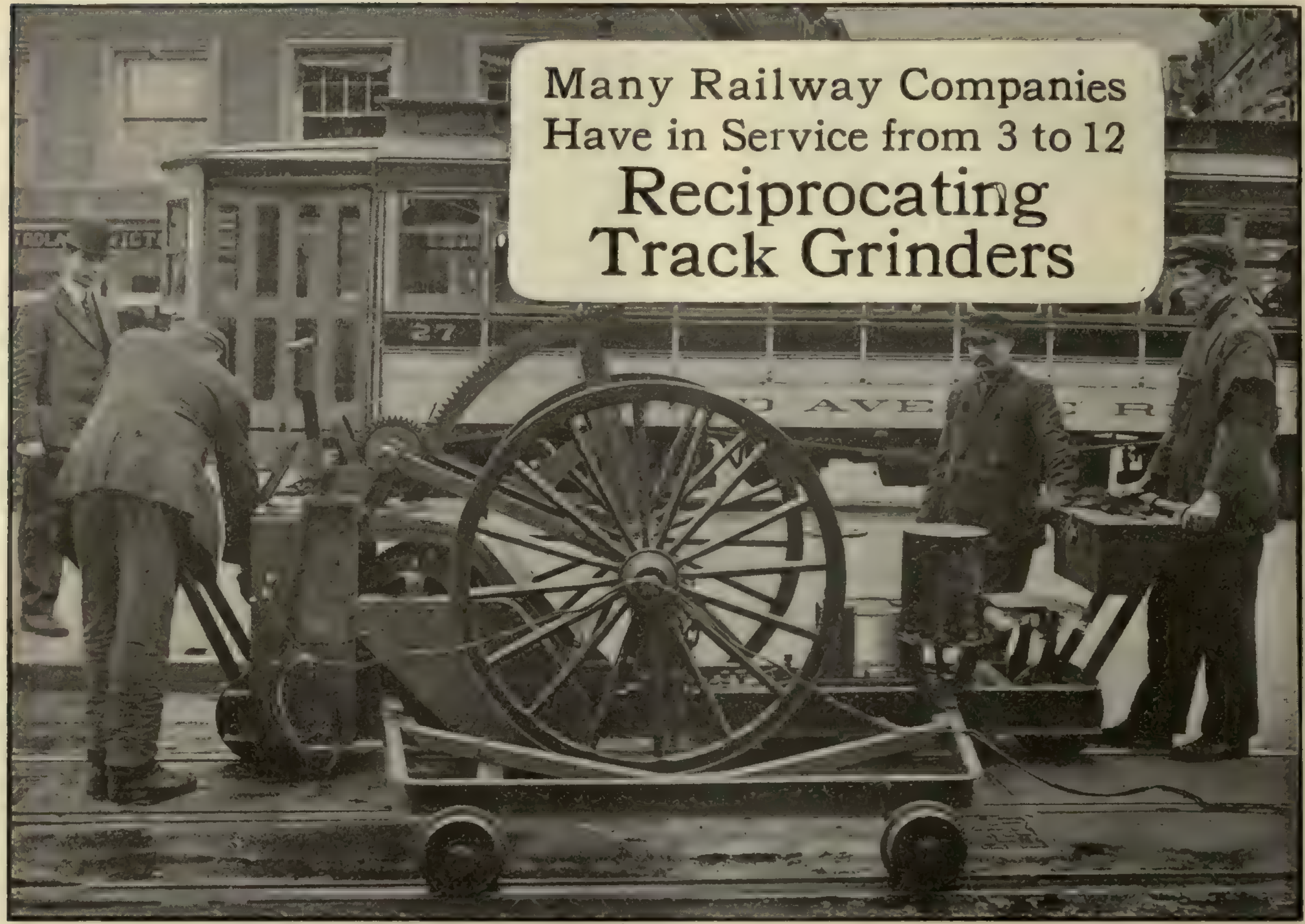
You are, or ought to be, vitally interested in the pavement between your tracks. No matter what arrangement you have with the "city fathers," you should write today for complete data on this durable, smooth, sanitary modern pavement. Dunn Paving Engineers are ready to help you solve your paving problems.

Manufacturers Licensed by

Dunn Wire-Cut Lug Brick Co., Conneaut, Ohio

LICENSEES:

- Corry Brick & Tile Company, Corry, Pa.
- United Brick Company, Greensburg, Pa.
  - One plant at Conneaut, Ohio.
- Sterling Brick Company, Olean, N. Y.
- Reynoldsville Brick & Tile Co., Reynoldsville, Pa.
- Danville Brick Company, Danville, Ill.
- Clinton Paving Brick Company, Clinton, Ind.
- Alton Brick Company, Alton, Ill.
- Medal Paving Brick Co., Cleveland, Ohio.
  - One plant at Cleveland, Ohio.
  - One plant at Carrollton, Ohio.
  - One plant at Malvern, Ohio.
  - One plant at Wooster, Ohio.
- Metropolitan Paving Brick Co., Canton, Ohio.
  - Four plants at Canton, Ohio.
  - One plant at Willow, Ohio.
- Bessemer Limestone Co., Youngstown, Ohio.
  - Three Plants at Bessemer, Pa.
- Peebles Paving Brick Co., Portsmouth, Ohio.
  - Two plants at Portsmouth, Ohio.
  - One plant at Firebrick, Ky.
- Murphysboro Paving Brick Co., Murphysboro, Ill.
- Southern Clay Mfg. Co., Chattanooga, Tenn.
  - One plant at Robbins, Tenn.
  - One plant at Coaldale, Ala.
  - One plant at Birmingham, Ala.
- McAvoy Vitrified Brick Co., Philadelphia, Pa.
  - One plant at Perkiomen Junction, Pa.
- Windsor Brick Company, Akron, Ohio.
- Hocking Valley Brick Company, Columbus, Ohio.
  - One plant at Logan, Ohio.
- Veedersburg Paver Co., Veedersburg, Ind.
- Springfield Paving Brick Co., Springfield, Ill.
- Terre Haute Vitrified Brick Co., Terre Haute, Ind.
- Albion Vitrified Brick Co., Albion, Ill.
- Alliance Clay Products Co., Alliance, Ohio.
- Westport Paving Brick Co., Baltimore, Md.
  - One plant at Westport, Md.
- The Mack Mfg. Co., New Cumberland, W. Va.
  - Four plants at New Cumberland, W. Va.
- The Hydraulic-Press Brick Co., St. Louis, Mo.
- The Barr Clay Co., Streator, Ill.
- Burton-Townsend Co., Zanesville, O. Two plants.
- The Trimble Paving Brick Co., Dayton, Ohio.
  - One plant at Trimble, Ohio.
  - One plant at Glouster, Ohio.
- The Thornton Fire Brick Co., Clarksburg, W. Va.
  - One plant at Thornton, W. Va.
- Indiana Paving Brick & Block Co., Brazil, Ind.
- Standard Brick Co., Crawfordsville, Ind.
- Shawmut Paving Brick Works, Shawmut, Pa.
- The Pennsylvania Clay Co., Pittsburgh, Pa.
  - One plant at Conway, Pa.
  - One plant at Crows Run, Pa.
  - One plant at Bradys Run, Pa.
- Clydesdale Brick & Stone Co., Pittsburgh, Pa.
  - Plant at Elwood City, Pa.
- John Kline Brick Co., Wickliffe, Ohio.
- Streator Clay Mfg. Co., Streator, Ill.
- Martinsville Brick Co., Martinsville, Ind.
- Cleveland Brick & Clay Co., Cleveland, Ohio.
- Jamestown Shale Paving Brick Co., Jamestown, N. Y.
- Purington Paving Brick Co., Galesburg, Ill.



Pretty strong evidence of two things.

First, that the elimination of corrugations and bad joints **pays.**

Second, that the Reciprocating Grinder does the work thoroughly, economically, and gives the highest satisfaction.

You can prove the accuracy of these conclusions on your own road to your own satisfaction without any rush or expense to your company.

Simply tell us to put a Reciprocating Track Grinder on your tracks for purposes of demonstration and thorough trial.

Then you can keep and pay for the machine, or not, as you please.

You don't have to take our word for the benefits you will get from the use of this machine.

You don't have to rely on the evidence of other users.

You don't have to rely on any preliminary judgment.

Just get a Reciprocating Grinder at work on your tracks and let the **results** do all the talking.

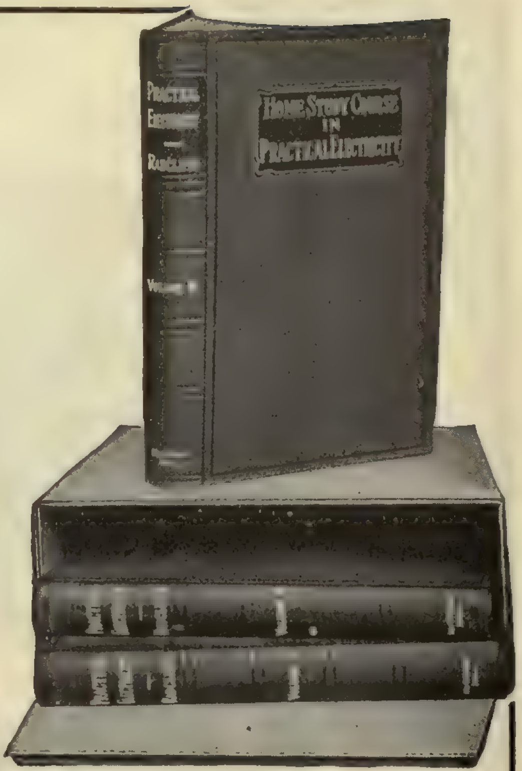
A large percentage of our customers **began** using the Reciprocating Grinder on this basis of **proven** satisfaction.

Railway Track-work Company

30th and Walnut Sts., Philadelphia, U. S. A.

If you were sure—

If you were sure that all we have said about Radcliffe's Home Study Course in Practical Electricity were true, you would want to see them before the sun sets on another day.



We are ready to prove every statement, absolutely. The best evidence of a thing is the thing itself.

You are human and it is human to be skeptical.

Here are three statements which will down the most obstinate skepticism—

(1) Radcliffe's Home Study Course in Practical Electricity will answer in a strictly non-technical manner 1,400 of your electrical questions.

(2) Every line and every illustration in the 700 pages are taken direct from practice.

(3) Every line and every illustration you can understand.

Here is the proof of everything we have ever said about the books →

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Gentlemen:—Please send to me, charges paid, the Home Study Course in Practical Electricity, three volumes, price $6.00. I agree to examine the books carefully and if satisfactory will remit $1 in ten days and the balance at the rate of $1 per month. If books are not wanted I will write you for shipping directions.

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E.R.J. 12-16

Sleet Days Are Here!

Delay No Longer—
Get a Full Supply of

Columbia Trolley Wheels

In addition to our standard solid trolley wheels for general service, we direct your attention to the

Columbia Sleet Cutting Wheel

The ideal trolley wheel for insuring uninterrupted collection of current during the prevalence of hail, sleet, snow or ice. Does its work effectively without the aid of auxiliary sleet-cutting devices.

Columbia trolley wheels of both types in diameters of 4-in., 5-in. and 6-in. are in stock ready for immediate shipment. You can meet many other of your wants by ordering from this general list of Columbia products.

Here are some Columbia-made specialties conveniently listed:

TOOLS

Armature and axle straighteners
Armature buggies and stands
Babbitting molds
Banding and heading machines
Car replacers
Coil taping machines for armature leads
Coil winding machines
Pinion pullers
Pit jacks
Signal or target switches
Tension stands

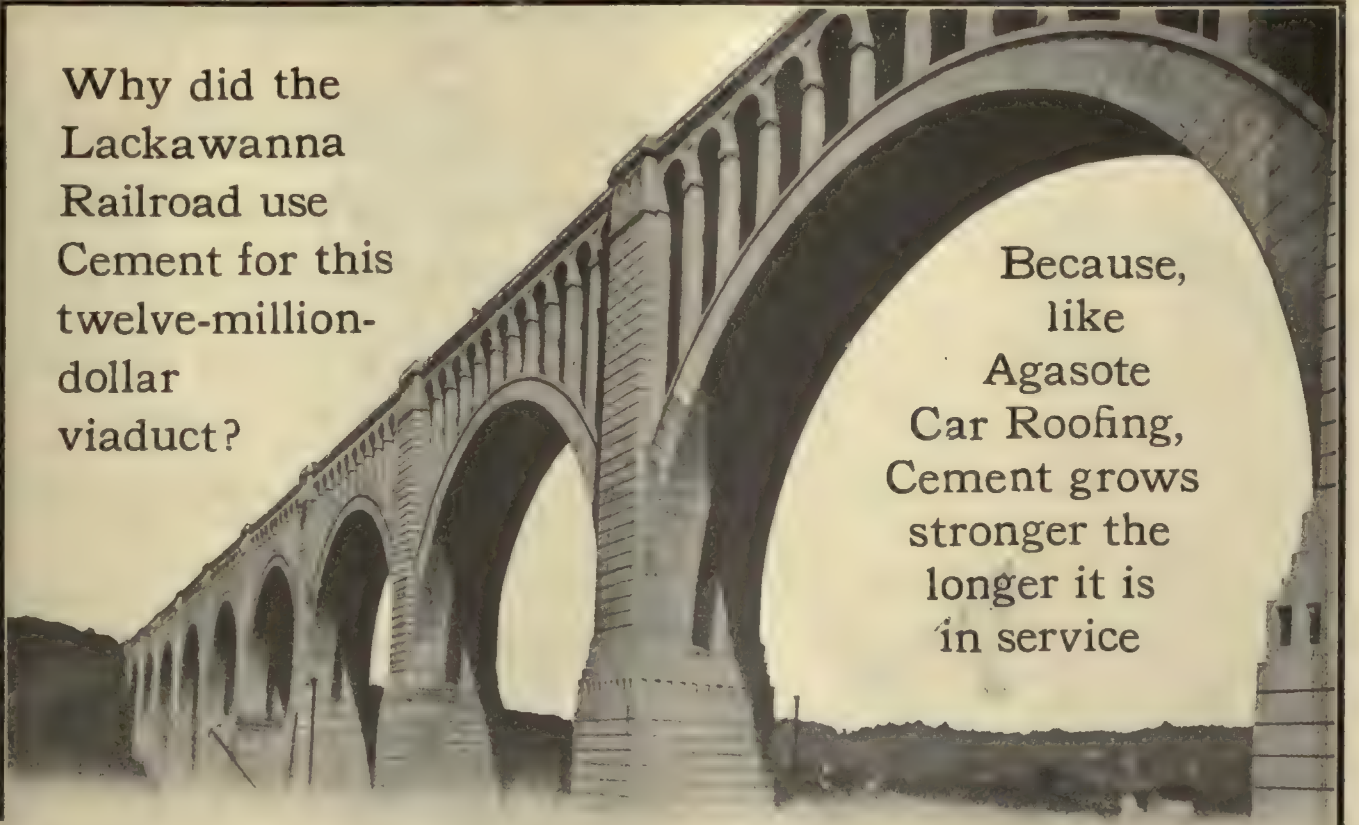
CAR EQUIPMENT

Armature and field coils
Brush-holders and brush-holder springs
Brake, door and other handles
Brake forgings, rigging, etc.
Car trimmings
Commutators
Controller handles
Forgings of all kinds
Gear cases (steel or mall. iron)
Grid resistors
Third-rail contact-shoes and accessories
Trolley poles (steel) and wheels

Columbia Machine Works & Malleable Iron Co.

Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

W. R. Kerschner Co., Inc., N. Y. Holden & White, Chicago F. F. Bodler, San Francisco


Why did the Lackawanna Railroad use Cement for this twelve-million-dollar viaduct?
Because, like Agasote Car Roofing, Cement grows stronger the longer it is in service

Use Agasote Car Roofing—

The Longer It's Used, the Stronger It Grows

Don't get the idea that Agasote Roofing is a built-up, or veneered or fragile material—it *isn't*. It *is* a tough, light, strong, waterproof material that is as homogeneous as cement or stone.

In fact, it closely resembles cement in one remarkable characteristic—for, just as cement grows harder and harder, stronger and stronger in service, so does Agasote. It undergoes a molecular action similar in its results to the "setting" of cement.

It is light, too—needs less than half as many carlines as ordinary roofing—costs less to haul around, and is easier, quicker and cheaper to put on.

It is waterproof in itself—needs no "overcoat" of white lead and canvas; only a little lead in the joints, covered with a narrow canvas sealing-strip.

Easier and quicker to repair in case of damages than any other roof, because it will *not* split—is non-combustible, and holds paint indefinitely.

Do you know of any other car-roofing material of which these statements can truthfully be made? Then investigate.

The Pantasote Co.

Manufacturers also of Pantasote—the most widely used and highly standardized railway car curtain material on the market.

11 Broadway, New York
People's Gas Bldg., Chicago, Ill.
797 Monadnock Bldg., San Francisco, Cal.

Why the Hale and Kilburn Corner Grip Handle?

The patented type of grip handle common to Hale and Kilburn seats for city and suburban cars is but one of many reasons for making Hale and Kilburn seats your standard.

Note that this corner grip handle is formed by a continuation of the seat back contour, thus permitting the most symmetrical, least conspicuous and strongest construction possible—

Instead of using clumsy loops on the top of the seat or brazing or soldering the corner handle to the back band.

Accidents are Prevented

because the passenger does not have to twist or distort his hand in taking hold, thus preventing broken fingers or wrists, due to sudden lurching of the car.

In short, the Hale and Kilburn corner grip handle is

Most Serviceable,
Most Durable,
Best Looking,
and Safest

Pioneers in Steel Trim for Passenger Cars, including interior finish, steel doors, etc.

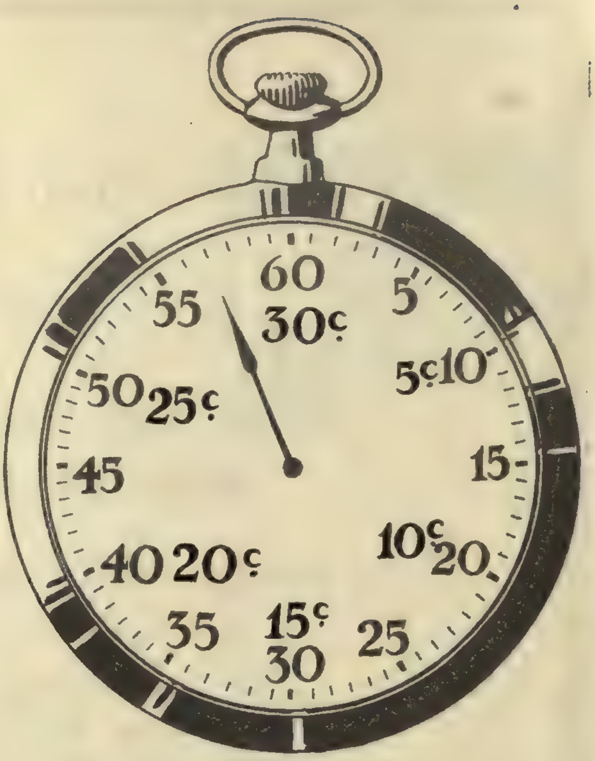
HK WALKOVER COPYRIGHTED

Hale and Kilburn Co.

Philadelphia New York Chicago
Washington San Francisco

HK WALKOVER COPYRIGHTED

The Bay State Street Railway Adopted National Pneumatic Door and Step Control for 200 Remodeled Cars



To Save the Car and to Cut the Time

Time IS Money

Two reasons why the Bay State Street Railway adopted National Pneumatic Door and Step Control to remodel 200 cars were to save the conductor 864 hand opening and closing operations during his 9-hour day and to get all the fares.

Two more reasons were the

PREVENTION OF DOOR SLAMMING

Thereby reducing door maintenance; and the

SAVING OF AT LEAST 2 SECONDS PER STOP

Or at least 28.6 minutes (1728) seconds in a car-day of 18 hours.

If a saving of 30 minutes is obtained the platform labor-saving (conductor and motorman) is 60 minutes or say 30 cents.

Thirty Cents Saved Each Day Means $109.50 a Year on One Item Alone!

NATIONAL PNEUMATIC COMPANY

50 Church St. New York

515 Laflin St. Chicago

Start Your Selling Campaign *for* 1917

With the Statistical Number of Electric Railway Journal

Dated January Sixth, Nineteen Seventeen

The Statistical Number of the Electric Railway Journal will be a mighty good advertising medium for *you* because it will be full of information vitally important to your *customers*.

Engineers, operating men, investors, manufacturers—all are keenly interested in its figures on equipment purchased during the preceding year—on technical and financial development—and in its forecasts of progress. It carries the prestige of original, exclusive, accurate information—and is preserved as a reference-medium for months. You can

Utilize This Prestige

to your very great advantage by starting your 1917 selling campaign with liberal space in the Statistical Number, and consistently carrying it through in all issues throughout the year.

Moreover, the assistance of a corps of experienced advertising men is available on request. Take advantage of it.

Annual Statistical Number

January 6, 1917

Member Audit Bureau of Circulations

ECONOMY
SANGAMO
BUILT LIKE A WATCH
METERS

MR. MANAGER:

What do you know about brake shoe setting on your cars?

Are brakes set tight and snug just because the motormen say they can't run with them any other way? A motorman can stop a car with tight brakes **more quickly,** and with **less effort,** than one with properly adjusted brakes. A barn man can set brakes **more quickly,** and with **less effort,** by setting them good and snug. He knows they won't be turned in on account of slack brakes, and a day's run will wear the adjustment into O. K. condition.

But **YOU** know what tight brakes do to energy and equipment!

Or are brakes set with regard to economy of energy and equipment, and are your motormen and barn men co-operating in this respect? Properly adjusted brakes mean elimination of one cause of wasted energy; efficient motormen operating these brakes will still further reduce your energy and maintenance costs.

ECONOMY METERS and the ECONOMY CAMPAIGN will teach your motormen efficient operation. ECONOMY RECORDS will help them detect poor brake setting. **THEY** will see that the brakes are properly set, if they are rated with ECONOMY METERS.

Sangamo Electric Company
Springfield, Illinois
Specialists in Meters for every Electrical Need

"There wasn't a scratch on him"

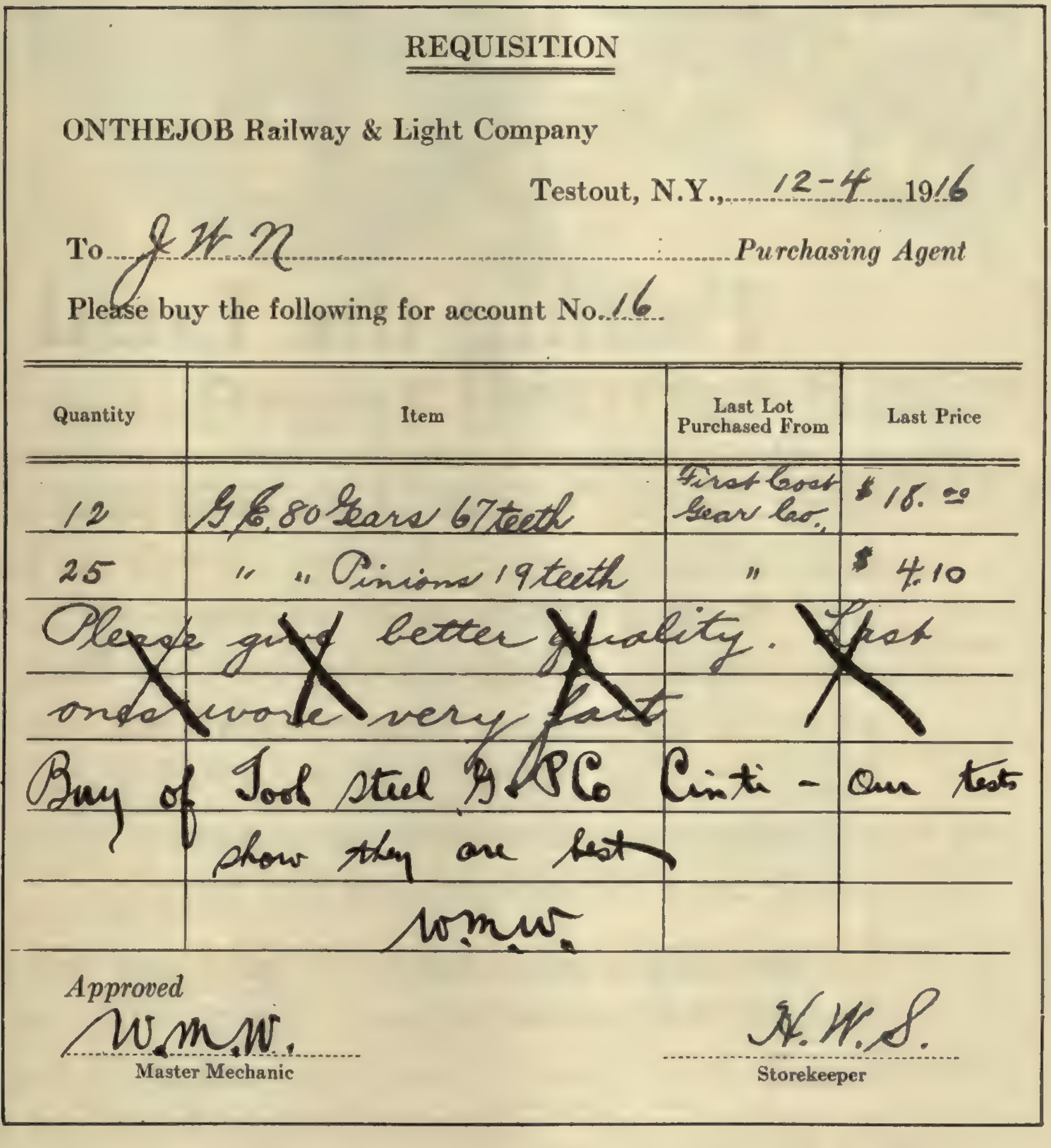
reported Conductor Smith of the Marble Avenue line, "hardly any dust. He just crawled off from the basket or tray on which he had been carried for 10 ft. or more. When I got to him he was brushing the dust off his clothes. Told me he wasn't hurt, and that the bump was due to his own carelessness, anyway. He was so decent about it, and it was so plain that he wasn't hurt, that I never thought of getting his name and address so that the Claim Department could hurry around to his home to have him sign a release. Here are the witness slips, though—I didn't forget *them.*"

"Good boy, Smith," replied the Superintendent of Transportation. "The H-B Life Guard sure did come across all right. It's not every day that you can scoop up a man, carry him along ten feet and have him come up smiling. All we need is his signature on a release to know we're insured against the ambulance chaser."

"Leave that to me, old man," said the Claim Agent. "I'll look up all these witnesses at once, so if Mr. Man does change his mind and bring suit, we'll have the goods on him. That H-B Life Guard is going to prove a mighty good friend to the Claim Department."

The Consolidated Car Fender Co.
Providence, R. I.
General Sales Agents
Wendell & MacDuffie Co.
61 Broadway, N. Y.

Third of a series of talks on Fewer Accidents and Better Public Relations



REQUISITION

ONTHEJOB Railway & Light Company

Testout, N.Y., 12-4 1916

To J W N Purchasing Agent

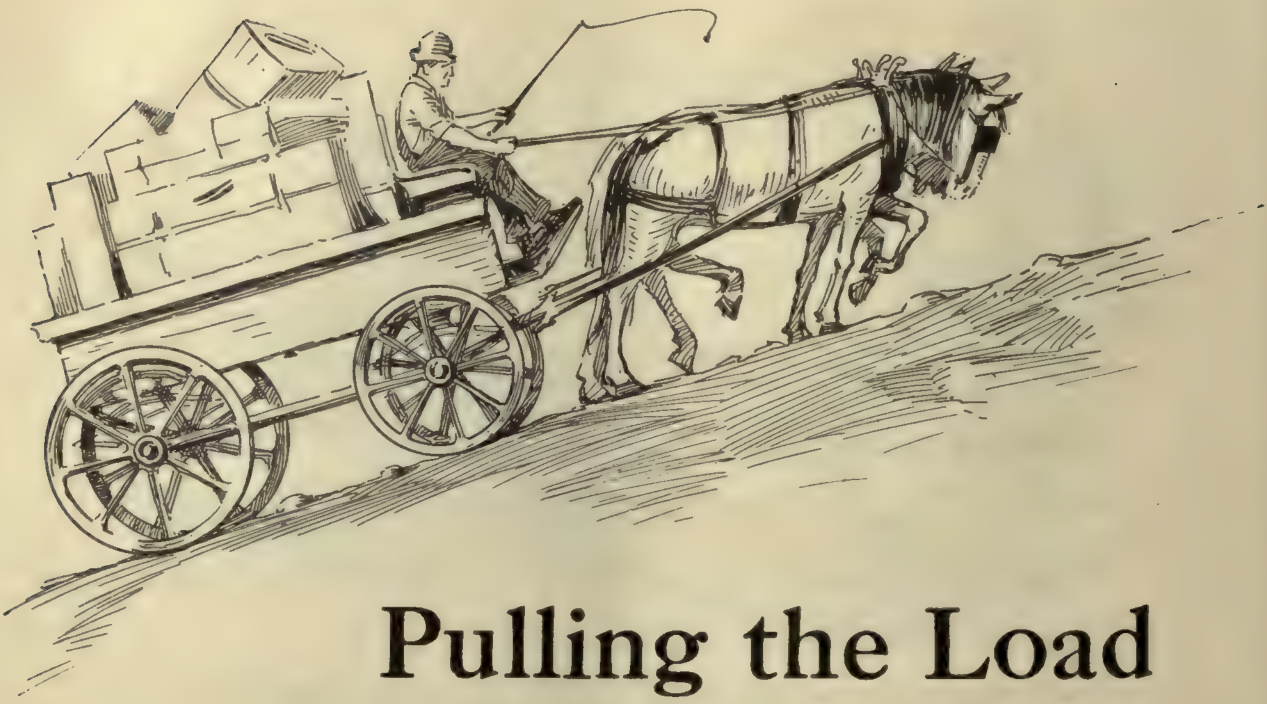
Please buy the following for account No. 16

Quantity	Item	Last Lot Purchased From	Last Price
12	G.E. 80 Gears 67 teeth	First Cost Gear Co.	$ 18.00
25	" " Pinions 19 teeth	"	$ 4.10
~~Please~~	~~give better quality.~~		~~Last~~
~~ones~~	~~wore very fast~~		
Buy of	Tool steel G. P Co	Cinti –	Our tests
	show they are best		
	W.M.W.		

Approved

W.M.W.
Master Mechanic

H.W.S.
Storekeeper



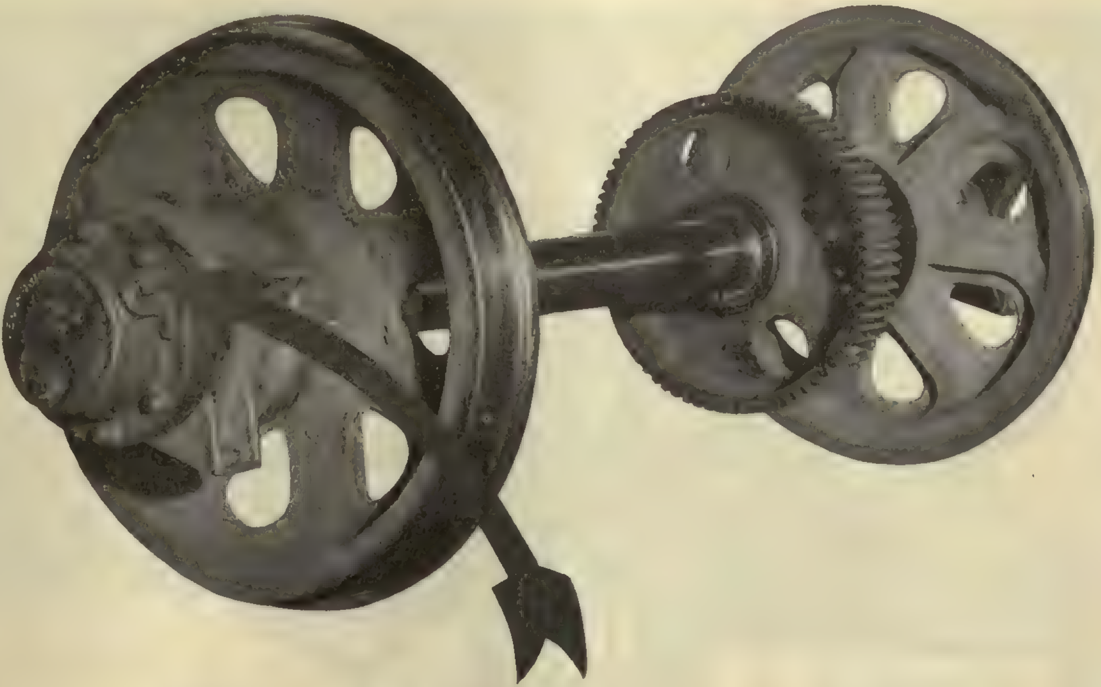
Pulling the Load

Down hill and on the level, a load moves easily; but up a grade it is a hard pull. You wouldn't try to move a load up hill with the brakes set. But that is the practice in many powerhouses. Any ordinary oil answers the purpose fairly well when the engines are running light, but when the load comes on and the pull is up hill, then every bearing should turn with the minimum of friction —you need the best oil you can buy.

Specially compounded of the finest materials to meet the severest service, Galena Oils are unequalled for powerhouse lubrication. They are so exceptionally good that we stand back of them with a guarantee of service and cost.

Galena-Signal Oil Co.

Franklin, Pa.



Hess-Bright Bearings Easier to Lubricate than Plain Bearings

The lubrication of a Hess-Bright Ball-Bearing Journal Box is not a process that must be repeated every day or week.

The Hess-Bright Ball-Bearing Journal Boxes going into service at Rochester will be lubricated at intervals of three months—well within the safety limit.

No careful selection or packing of waste and lubricant will be required with Hess-Bright Ball-Bearing Journal Boxes.

Just take out one plug, use a force gun or squirt pump to fill with lubricant, replace the plug and then send the car out with the assurance that you will have

TRADE MARK
HB DWF
HESS-BRIGHT
THE INIMITABLE BEARING

- Minimum energy consumption,
- No excessive lubrication costs,
- No hot journals and consequent delays in service,
- Important reduction of journal box inspection and lubrication time and expense.

THE HESS-BRIGHT MANUFACTURING COMPANY
FRONT ST. & ERIE AVE., PHILADELPHIA, PA.
HESS-BRIGHT CONRAD PATENTS ARE THOROUGHLY ADJUDICATED

COLLIER SERVICE

YOU
are cordially
INVITED
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CANDLER
BUILDING
220 W. 42nd. St.
NEW YORK CITY

CAR
ADVERTISING
ALMOST
EVERYWHERE

Barron G. Collier
INCORPORATED

Davis Steel Wheels Are Ground to Contour

DAVIS Steel Wheels

The steel wheel with the one-wear tread.

No turning—no trouble with motor clearances.

A hard, tough manganese tread and flange.

A soft, ductile steel plate and hub.

Reduction in weight.

20% saving in weight.

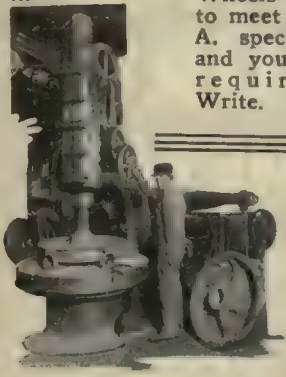
Minimum maintenance cost.

Strength — safety—economy.

The steel wheel backed by years of successful service.

You are not expected to adjust your conditions to meet our product.

Davis Steel Wheels are made to meet A. E. R. A. specifications, and your service requirements. Write.



Boring out the hub of a Davis Steel Wheel.

The tread of every Davis Steel Wheel is ground to contour. The rolling surfaces are therefore absolutely true and round, which greatly minimizes the possibility of the wheel's sliding when the brake shoes are set.

Too much emphasis cannot be placed on this point, because "out-of-round" wheels will cause dangerous stresses in the car and track structures, besides being productive of "slid flats." A cast wheel must be ground to insure rotundity.

Grinding of the treads is only one instance of the care used in manufacturing Davis Wheels. Every wheel is subjected to a drop test. Every wheel is tested for uniform hardness, and it is safe to say that the testing of the Davis Wheel exceeds in thoroughness that given any other wheel.

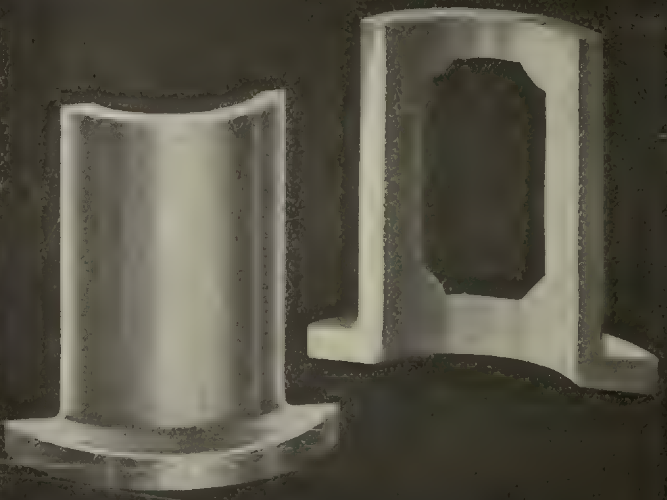
The Davis Wheel retains the logical one-wear principle of the cast iron wheel, besides insuring greater strength, safety and lower maintenance cost. It avoids the disadvantages of a wrought steel wheel, such as expensive turnings, with the consequent adjustment of motor clearances and the expense of replacing partly worn brasses with new ones when a pair of wheels is changed.

Get all the data on Davis Steel Wheels and figure the saving they will make for *you*.

American Steel Foundries

1100 McCORMICK BUILDING CHICAGO

MORE-JONES 'TIGER' BRONZE AXLE *and* ARMATURE BEARINGS



The wonderful density of the metal composing MORE-JONES "TIGER" BRONZE AXLE BEARINGS offers the very minimum of frictional resistance. This means a saving in lubrication and lessens wear on journals. And more than this, they possess exceptional strength and toughness that results in service unequalled in durability and general efficiency by any other bearing.

MORE-JONES ARMATURE BABBITT METAL is recommended for the hardest armature service. In designing this brand we departed from conventional lines to produce an alloy adequate to resist the severest pressure, hammering and strains ever developed. Most widely used by electric railways because it goes furthest—lasts longest and can be used over and over again.

Further information and prices on application

More-Jones Brass & Metal Company, St. Louis, U. S. A.

MORE-JONES ARMATURE BABBITT METAL

600 Rico Coasting Recorders *on the* Pacific Electric Railway, Los Angeles

The applicability of the Rico Coasting Recorder to *every* class of electric railway passenger and express service could not be shown to better advantage than on the 1060-mile city, suburban and interurban system of the Pacific Electric Railway.

Low-speed single-car service in such famous villa cities as Pasadena, one or two-car rapid transit operation on the many suburban runs out of Los Angeles, heavy-train, high-speed service like San Bernardino, motor car express. . . .

Since December, 1915, each and every one of these varieties of electric railway operation has been made more efficient by the use of

The True Principle for Measuring Operating Efficiency

Time is the Essence of Railroading

RAILWAY IMPROVEMENT CO. RICO 61 BROADWAY, NEW YORK

"Satisfaction Insurance"

WITH

G-E Carbon Brushes

G-E carbon brushes for railway motor commutators invariably give continued satisfaction when the proper grade is chosen for the work in hand.

It is a fact that no railway has ever had cause to regret the adoption of the grade of G-E brush prescribed by our specialists for individual conditions.

Here are a few results. While exceptional in performance, they indicate what G-E stock brushes, properly chosen, can do.

> A full complement of Grade D brushes on a car equipped with G-E 205 motors has run 34,500 miles and the brushes are still in perfect condition.
>
> Grade B2 brushes on G-E 214 motor ran 25,000 miles with but 1/16 of an inch wear.
>
> G-E brushes in test with other makes are still running after five months with very little wear. Other makes have broken or worn out.

Many competitive tests have been won by G-E brushes, and every such test has resulted in an order for the G-E product.

If you are having brush trouble

"PUT IT UP TO OUR ENGINEERS"

General Electric Company

General Office: Schenectady, N. Y.

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For Texas, Oklahoma and Arizona business refer to Southwest General Electric Company (formerly Hobson Electric Co.), Dallas, El Paso Houston and Oklahoma City. For Canadian business refer to Canadian General Electric Company, Ltd., Toronto, Ont.

6667

Electric Railway Journal

Published by the McGraw Publishing Company Inc.
Consolidation of STREET RAILWAY JOURNAL AND ELECTRIC RAILWAY REVIEW

Vol. XLVIII NEW YORK, SATURDAY, DECEMBER 16, 1916 No. 25

RAILWAY ABILITY HONORED

The appointment of Sir Albert Stanley to the British Cabinet is a well-merited recognition of his executive ability in the conduct of the transportation system in London, and through him the electric railway industry in both continents is honored. This appointment also emphasizes the difference in public rewards, in this country and abroad, accorded to men having the ability to conduct large public utility affairs successfully. Under British rule, for example, honor for signal service along such lines is not uncommon. To cite a few instances, there is Sir Albert himself, as well as Sir Thomas Shaughnessy, Sir William MacKenzie, Sir William Van Horne, Sir Donald Mann and Sir Clifton Robinson, all of whom served the empire through their development and direction of large railway affairs. Here, on the contrary, as is well known, the existing public attitude usually puts railway men on the defensive, and active leadership in a railway corporation instead of being accepted as a reason for elevation to high political office is often considered by the public as an argument against it. This is not right. The man who makes an important addition to the transportation facilities of the country, or who, by his successful management, makes such a system of greater use to the public, confers a benefit upon the community which he serves, and, if he was called to political office, we are sure he would serve the public with the same energy and ability that he gave to corporation affairs.

A VISION OF A GREATER CHICAGO

Chicago has waited a long time for the subways which are proposed by the present Traction and Subway Commission. The fact is generally recognized that the present transportation system in that city, though ably conducted, is inadequate for the needs of the city, and that a more efficient system is necessary if the city is to grow as it should and maintain its commercial supremacy in the Central States. The need for some system of underground transit was apparent even in the time of Charles T. Yerkes, but the time was not ripe for subways then. At that period the idea was not sufficiently accepted that in any large undertaking on which the prosperity of the city is so dependent as it is upon a comprehensive rapid transit system, there should be a combination of the forces of both the municipality and private capital to secure the best results. Both the city and the railway companies in Chicago have been gainers by this delay, because by the union of their forces they can now create a more extensive and permanent system of transportation than could private capital alone. Until the full financial plan is published, it is impossible to predict to what extent it will appeal to those who will have to undertake the actual work. But if it is at all reasonable, it is safe to say that those in control of the present roads in Chicago have the vision as well as the means to build a system capable of serving the 5,000,000 people which the city will contain in 1950, according to the report. We trust that the plan will go through and that it will be another example of the merits of combined private and municipal investment under private operation, a plan for municipal utilities which seems to be a characteristic of the present decade.

ROCHESTER TRAFFIC CONDITIONS

Rochester, N. Y., has the reputation of being a very progressive city. It is also a very critical one and part of this criticism flows in the direction of the street railway. The management of the railway has made unusual and successful efforts to promote friendly relations with the public, but the public friendship sometimes appears in disguise. Some months ago the local Chamber of Commerce engaged Bion J. Arnold to study the transportation situation and indicate the most feasible lines of improvement. In this investigation the railway management co-operated heartily, well knowing what the result would be. A fair investigation of this sort could not but reflect creditably upon the management as it would bring out the difficulties involved and the lengths to which the railway had gone in overcoming them. Mr. Arnold's report was presented a few weeks ago, and an abstract of it appears elsewhere in this issue. The time was very propitious for the presentation of this report for, after long and thorough study, the company had earlier in the year ordered a half-hundred cars of a type designed particularly for the local conditions. This type of car, which is described in an article by General Manager E. J. Cook also in this issue, was favorably mentioned by Mr. Arnold in his report. A sample car was due to arrive in Rochester at about the time of the completion of the report and it has now been giving fine service for several weeks. Its presence in the city serves as an omen of the improved service to come. Mr. Cook's description of the car and the abstract of the Arnold report should be studied together because, for the reasons mentioned above, they complement each other. The car is described with particular reference to its transportation features, *i.e.*, boarding and alighting, fare collection, etc., but there are novelties in equipment mentioned by Mr. Cook which are worthy of attention also. The provisions for eliminating friction, removing arcing from controller fingers and making the wiring simple and substantial are among these. In Mr. Arnold's report possibly the most noteworthy section is that devoted to the study of geographical distribution of industrial workers and its relation to traffic possibilities. The method used is, we believe, described here for the first time.

THE CHICAGO TRACTION PLAN

The general plan recommended by the Chicago Traction and Subway Commission for Chicago's future transportation facilities was published in last week's issue, although not yet in completed form or ready for submission to the City Council. Until the great mass of supporting data and background for the conclusions reached is made public no comment as to the reasonableness or adequacy of the proposed plan is possible. Nevertheless, it is clear to see from the proposed scheme that certain fundamental considerations have governed the commission in its study. Perhaps the first of these is the assumption that all of the traction facilities will be unified. The advantages of this are pre-eminent and entirely necessary to the financing of the project. With this established, the next step has been to revamp the present elevated system into a completely rapid transit instead of largely local system, as at present, and to separate definitely the long and short-haul traffic, using the surface lines as feeders for the long-haul rapid transit. A third important consideration has been the "pulling out" of the loop in all directions to alleviate the congested business district now seemingly girdled with the present iron band. This is accomplished in the north and south directions through a physical lengthening of the loop by extending the elevated structure south on Fifth Avenue from Van Buren to Polk Street, and by building a subway straight through State Street to Chicago Avenue on the north, and in the east and west directions by supplying both north and south travel on both sides of the loop, which in effect spreads the loop out. A fourth important consideration has been the provision of direct through rapid transit between the northwest and southwest sides of the city without the necessity of detouring this traffic through the central congested area as at present.

While the recommendations of this eminent board of engineers cover the traction program tentatively for fifty years, the immediate nine-year construction program is the really tangible fact, for the board does not presume to forecast the future conditions with such certainty as to warrant planning any definite procedure beyond the nine years. This immediate construction program calls for the rapid transit subway from Eighteenth Street on the South Side Elevated through State Street to Chicago Avenue and thence west, connecting with the Northwestern Elevated. The loop is to be extended and expanded as already noted. The north, south and east sides of the present loop will be utilized entirely for two-way traffic of the West Side trains, with the present grade crossings with the north and south trains at the two west corners of the loop eliminated by two level construction. The portion of the elevated structure at the Congress Street station, the North Water Street stub extended across the river to the State Street loop station, and the Fifth Avenue stub terminal of the Metropolitan Elevated with an extension of the Franklin Street stub into this terminal, will provide an important stub-terminal service out of the central district in all three directions during the great evening rush. The congestion on the surface lines coming into the loop from the west will be eliminated by surface line subways under Washington and Jackson Streets, and across Michigan Avenue or under Grant Park to route these cars through without a switching back. These subways extend west to Clinton Street and the commission says that while they will not be self-supporting financially, it seems necessary that the expense be carried as the only means of avoiding the present crowded condition of the streets. Then finally, in the immediate plan, in addition to completely triple and quadruple tracking the present elevated system, is the building of the Ashland Avenue elevated connecting the Northwest and Southwest sides of the city. This line will connect with the present west, southwest and northwest elevated lines, and there will be constructed two additional branches in the northwest section. Then in the future, when the city's growth warrants, will come the main borough, which will extend from Seventy-first Street on the south, through Cottage Grove Avenue and Clark Street, bisecting the present loop, and north on Clark Street to the Belmont-Wilson district. This is not required in the immediate future, as the engineers have first planned to make maximum use of all existing facilities, and is, of course, more or less a part of the tentative plan of the future.

It is interesting to note that the question of energy supply for the system is dismissed with the simple assumption that energy will be purchased. So far as the published text of the report shows, there is no evidence that a separate power house was considered. This illustrates the change which has taken place in the minds of engineers as to the principles of the economical generation and distribution of energy. Ten years ago, if a $260,000,000 urban transportation system had been planned, one of the chief considerations would have been the power house. When this incident is considered in the light of its relation to the future electrification of steam railroads in the centers of great density of population or density of tonnage, it takes on added significance.

To speak broadly, the Chicago plan seems feasible and offers apparently great conveniences as compared with the present crowded and inadequate dual system. It alleviates completely the present condition by which thirteen tracks on the elevated focus onto two tracks in the loop, and instead there will be in the immediate rapid transit system probably fifteen tracks delivering through six.

Are You Getting a Fair Return?

Let the Publicity Man Explain Your Problems to the Public

IS your company getting a fair return for service rendered, and to be rendered, in the form of transportation—

A return sufficient not only to pay current expenses, but to improve service and anticipate transportation demands—

To make it possible to invite additional capital, maintain an adequate depreciation reserve, pay good wages and earn a decent dividend on the money put into the property?

If the answer to these questions is No, the next question is, What are you going to do about it?

The public does not demand that electric transportation be supplied below cost.

When it appears to do so (and this is often the case) it is because the public does not know the facts.

The public may have been told, but it was not convinced.

Recently, when it was demonstrated (by a publicity campaign) that the post-office department and a few rabid representatives were asking the railways to carry the parcel post for less than fair pay the proposition was promptly condemned by public opinion.

It would be much easier—if such is the fact—to convince people that their home transportation company is not getting a fair return—

That it is underpaid, overtaxed and otherwise hampered in the effort to provide first-class service—

That all sorts of unproductive expenditures are being forced upon the company—

That whatever may have been the sins of the past, the sole desire of the present is improvement and extension of service.

This can be done and it should be done.

The other policy of staving off the Day of Disaster by temporary expedients is a mere makeshift and a dangerous one.

If it took five years to convince the people of a community that they are not paying enough to secure the kind of transportation they demand, the time (and money) would be well spent.

A company that has this work to be done and isn't doing it is more short-sighted than one that failed to provide coal for its boilers or grease for the journal boxes.

A public utility company can't get money these days unless the public is convinced that the company is entitled to it.

The only way to establish such a conviction is by EDUCATION.

The only feasible and effective method of education is PUBLICITY.

And the only way to make sure that a campaign of educational publicity will be carried on effectively and continuously is to hire a PUBLICITY MAN to do the work.

Let him keep at it until the facts are hammered into the public consciousness.

Then if the community still wants transportation at less than cost they will know that they can only get it by paying the inevitable deficit out of a public treasury—not out of your security holders' pockets.

Equipment Details and Design of the New Rochester Car

Wide Entrances, Anti-Flashing Controllers, Anti-Friction Bearings, Liberal Window Area and Conspicuous Route Signs Are Among the Features of the Fifty New Front-Entrance, Center-Exit Cars of the New York State Railways, Rochester Lines

By E. J. COOK
General Manager New York State Railways, Rochester Lines

DATA OF NEW ROCHESTER CAR

Length over all	50 ft.
Length over body	49 ft.
Truck centers	26 ft. 3 in.
Wheelbase	5 ft. 2 in.
Width over side panels	8 ft. 3 in.
Width over window guards	8 ft. 4 in.
Height inside at center, approximate,	7 ft. 11½ in.
Height inside at bolster, approximate,	7 ft. 6 in.
Height rail to well floor	14 in.
Ramp in well floor	2½ in.
Height well floor to car floor	10 in.
Ramp in car floor, well to bolster	5½ in.
Post centers	30 in.
Width entrance door opening	5 ft. 4¾ in.
Width exit door opening	6 ft. 2 in.
Seating capacity	52
Weight, completely equipped	31,900 lb.

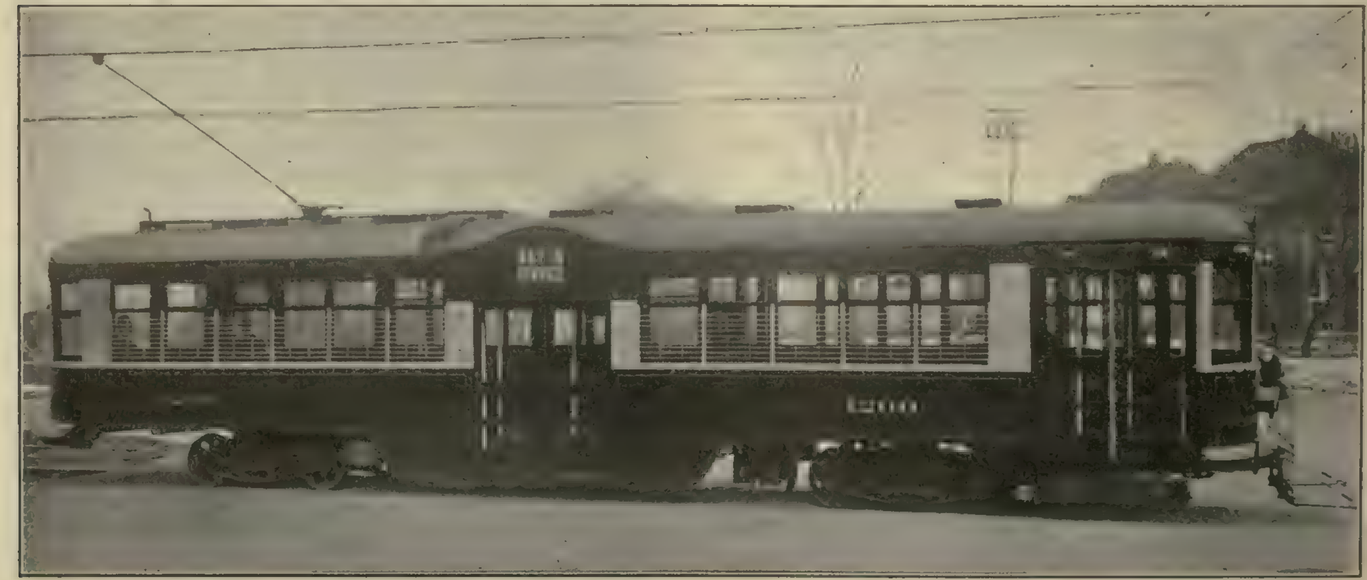
FOR the past few weeks there has been in operation in Rochester, N. Y., with satisfaction to the public and to the management of the New York State Railways, the first of an order of fifty front-entrance, center-exit cars of the pay-as-you-pass-the-fare-box type, the general scheme of which was conceived by Peter Witt, ex-street railroad commissioner of the city of Cleveland, and first practically applied in Cleveland on certain lines, and now being generally adopted by that company. The car has been named by Mr. Witt the "Car Rider's Car." The bodies are framed and covered, in general, in accordance with the standard design for steel cars of the builders, the Cincinnati Car Company. There are, however, some deviations from previous designs in these particulars, as well as a number of details original with the managers and engineers of the railway. In this article particular attention will be given to those elements of the design to which the railway management has devoted most attention.

BODY LAYOUT FROM TRANSPORTATION STANDPOINT

The plan and elevation of the car are given in outline in an accompanying illustration which is reproduced from the convention section of the ELECTRIC RAILWAY JOURNAL, Sept. 30, 1916, issue, page 570. On the plan attention is directed to the following salient items: The front platform is made extra long to permit the use of wide entrance doors. To encourage the use of the entire entrance opening by boarding passengers, a curved rail is mounted in the center of this space to divide the incoming passengers into two lines. The passageways are laid out to give a 28-in. width clear through on each side of the center railing, there being no "neck" to produce congestion.

The width of exit space was made as great as possible, the limitations being set by the necessary location of the air-brake cylinder. The exit space is closed by two sliding doors operated by Consolidated Car Heating Company's pneumatic engines. Hand-operated folding doors are used at the entrance.

The floor level arrangement, while determined primarily on the basis of convenience of passengers, was dictated partly by the necessity for providing clearance at the center on the devil-strip side for fenders of cars on the opposite track. Over the trucks the floor is 32 in. above the rails, with a ramp slope of 2 in. to the foot on each side of the exit well where it is carried through at a height of 27 in. Step heights were arranged so that in entering the passenger steps up 13 in. onto the folding step, 12 in. more to the front platform and 7 in. to



NEW ROCHESTER CAR—GENERAL VIEW OF END-ENTRANCE, CENTER-EXIT CAR NOW BEING ADDED TO EQUIPMENT OF NEW YORK STATE RAILWAYS the car floor. In leaving, he steps down 10½ in. into the exit well and 14 in. to the street level. No straps were provided for the support of standees, hand rails and stanchions being considered preferable under local conditions.

The conductor's station is just forward of the exit well, and he stands with his fare box before him, the outlet from the coal box at his right foot and the heater opposite to him. This arrangement provides for the division of the passengers into two groups, one ahead of the fare box and the other behind it, the latter of whom pay their fares as they pass the box to take their places in the rear. The other passengers pay as they leave the car. In commenting upon this arrangement for handling incoming passengers, Bion J. Arnold, in the Rochester traffic report abstracted this week, states his belief that it will greatly increase the loading speed under Rochester conditions.

Over the exit door is an illuminated sign 15 in. x 20 in. in size. A large sign in this position has been found to be a useful adjunct to the front-end signs.

NEW ROCHESTER CAR—INTERIOR VIEW, LOOKING TOWARD ENTRANCE

STRUCTURAL FEATURES OF THE BODY

The bodies of the new cars are of the all-steel Cincinnati Car Company type of construction. The side girder plates are lined on the inside with ½-in. of cork for heat insulating purposes. The carlines and posts are made of T-iron sections and are of the continuous type. The arch roof is made up of a sheet steel plate securely fastened to the upper faces of the carlines. On top of this plate is placed a 1-in. layer of corkboard and, this, in turn is covered with the usual treated and painted canvas.

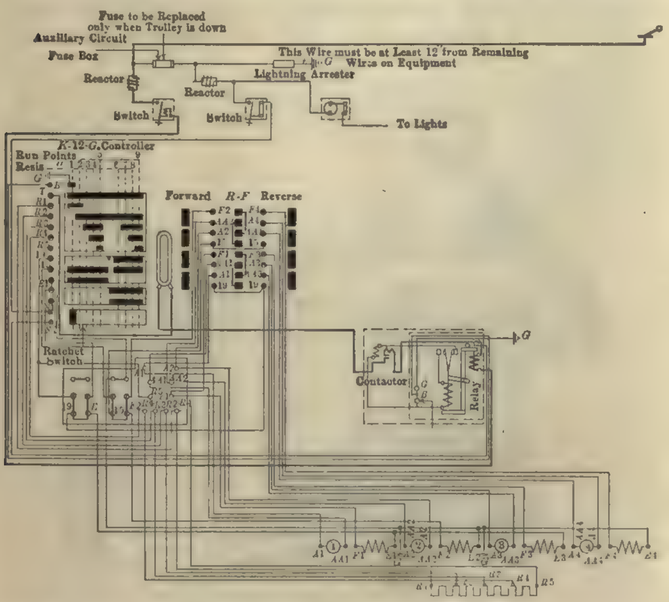
The floor is of double thickness except under the seats and the boards are grooved so that the use of a mat is not necessary. Trap doors are provided over the motors. The grooves are lengthwise on the level part of the floor and crosswise on the ramps. The space under the seats was inclosed partly to cover the heating ducts, air reservoir and wiring conduits, but also for the purpose of reducing the floor area which must be kept clean.

In order to increase the window height the letterboard has been made but 8¼-in. wide. Like the girder plate, this is of No. 14 gage steel.

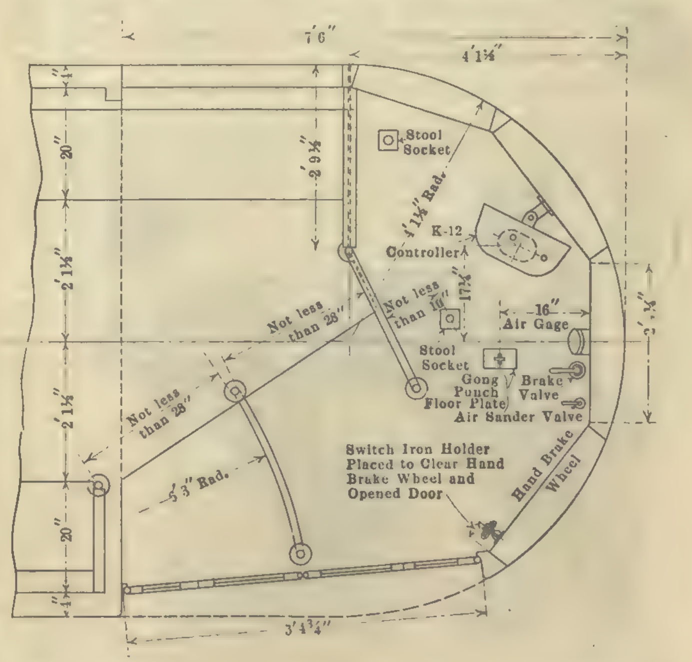
EQUIPMENT DETAILS

On each of the Baldwin arch-bar trucks, which have 26-in. wheels, are two General Electric 258-A motors. Hess-Bright ball journal bearings are used on the trucks as are also Woods side bearings. The latter contain three rollers each, the rollers, however, coming into action only when the car is rounding a curve.

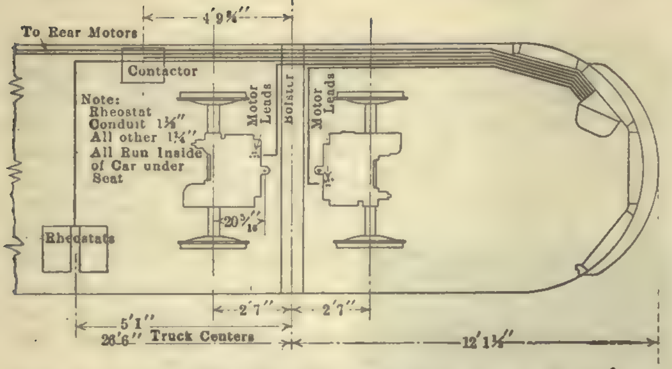
A new type of controller known as the K-12-G forms part of the equipment of the new cars and twenty-five of the older cars are also being remodeled to embody the essential feature of this controller. This feature is the use of an auxiliary contactor and relay which entirely removes the arcing from the controller segments. A wiring diagram is reproduced herewith, to show the details, together with photographs of the contactor and relay. From the former, it will be seen that there is at the bottom of the controller drum a ratchet switch, the function of which is to close the contactor when the controller handle is being turned in the "on" direction and to open the contactor whenever the direction of rotation of the handle is reversed. The name "ratchet switch"



NEW ROCHESTER CAR—WIRING DIAGRAMS, SHOWING RATCHET SWITCH AND CONTACTOR FOR REMOVING ARCING FROM CONTROLLER

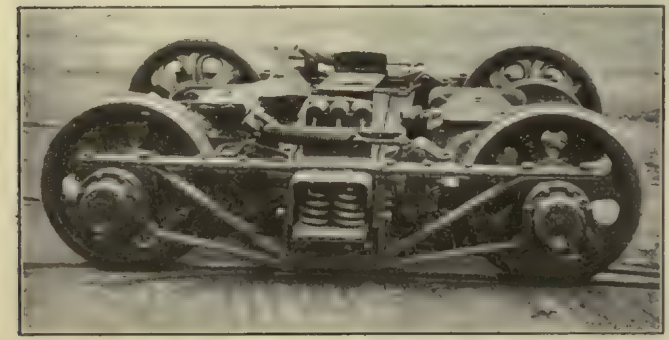


NEW ROCHESTER CAR—DETAILS OF FRONT VESTIBULE EQUIPMENT LAYOUT AND ARRANGEMENT OF ENTRANCE RAILINGS



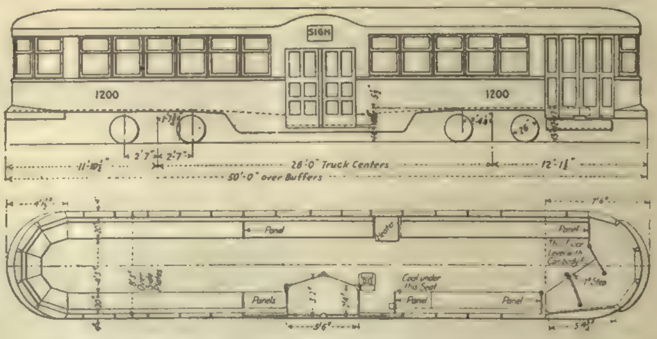
NEW ROCHESTER CAR—GENERAL ARRANGEMENT OF ELECTRICAL EQUIPMENT WITH CONDUIT RUNS

is given to this part of the controller because it contains a ratchet which permits a segment to join fingers $S1$ and $S2$ (see diagram) and remain in a position to bridge them while power is being turned on, but the segment is instantly removed by the ratchet when the controller handle is reversed from any position. Incidentally, the contactor also serves as an overload circuit breaker, a heavy coil being provided on the relay side to trip the contactor when the current exceeds a predetermined amount.



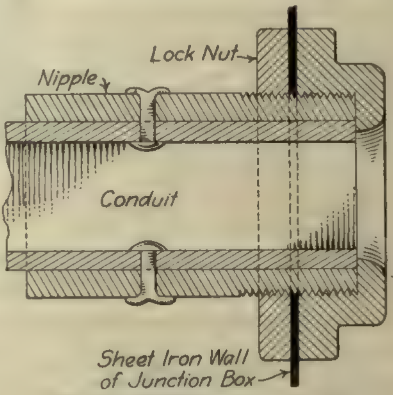
NEW ROCHESTER CAR—TRUCK WITH MOTORS IN PLACE

In laying out the control apparatus and wiring, the company's engineers encountered several interesting problems, the solutions of which are partly illustrated in the diagrams accompanying this article. For example, in the motorman's compartment the controller was mounted on an angle to clear the motorman's left knee A sheet iron junction box was placed behind the controller so that the latter could be wired from the rear. Holes were drilled in the side of the box to accommodate the "Alphaduct" conduit. As this procedure was somewhat novel, the engineers found it necessary to devise a fitting to join the ends of the conduit and the side of the junction box. The way in which this was done is illustrated in an accompanying sketch. This shows a short iron nipple riveted, with split copper rivets, to the outside of the duct, with nuts on both sides of the sheet iron to hold the nipple in place.



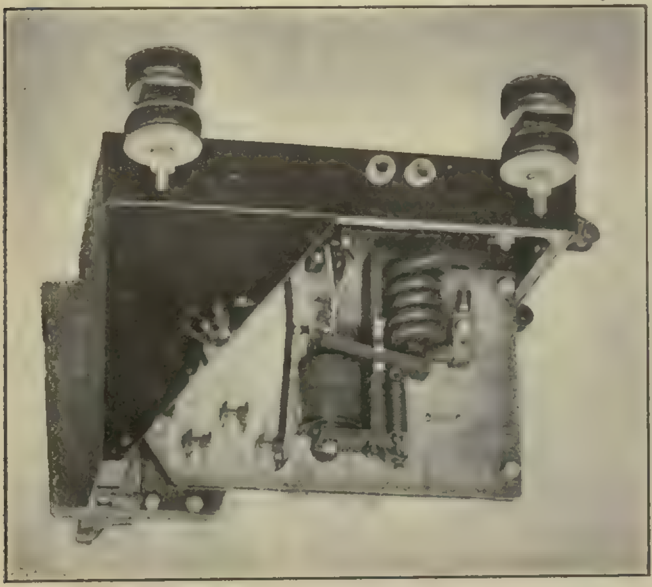
NEW ROCHESTER CAR—SIMPLIFIED ELEVATION AND PLAN

The wiring was laid out so that the conduits would be continuous from end to end, the main runs being located against the side of the car under the seats, the conduits being cleated to the car sides. An accompanying diagram shows the locations of the several pieces of equipment together with the conduit runs.

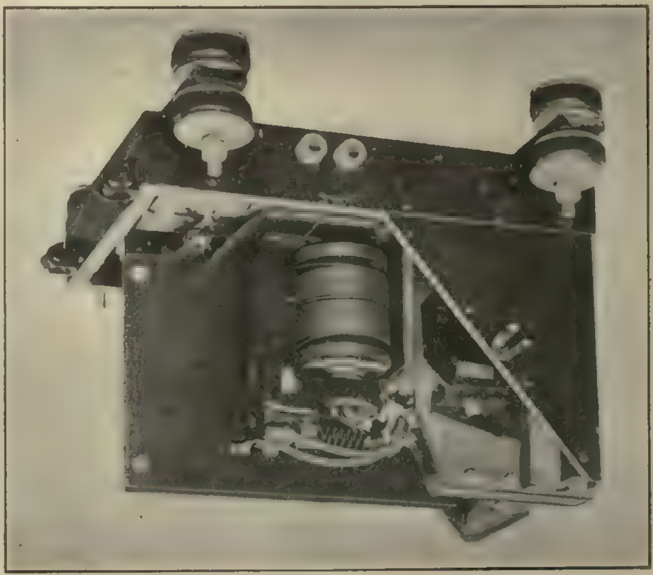


NEW ROCHESTER CAR—CONDUIT TERMINAL FITTING

While it is impossible within the compass of a brief article to describe all of the details of the equipment of this car the following items, being intimately related to the general design are worthy of note. The heating and ventilating arrangements have already been touched upon incidentally. More specifically the heater,



NEW ROCHESTER CAR—RELAY SIDE OF CONTACTOR BOX



NEW ROCHESTER CAR—CONTACTOR SIDE OF CONTACTOR BOX located opposite the conductor's station supplies air through a flue 3 in. by 8 in. in section mounted on the back of the seat riser several inches above the floor. The air is delivered through registers placed on about 30-in. centers.

The heater was supplied by the Consolidated Car Heating Company. The air brake equipment comprises a DH-10 Westinghouse compressor, and the usual parts of a straight-air equipment. The reservoir, which is mounted under the seat, is 12 in. in diameter and 84 in. long. A signal light is used for starting, the light being flashed on when all doors are closed. The door control is not interlocked with the power control.

In selecting the colors for the new car the importance of creating a pleasing impression was carefully considered. The result was the adoption of olive green for body, letterboard and roof, and cream for the parts.

The Public Service Corporation and the Working Man*

Joint Responsibility of Capital and Labor to Maintain Continuity of Service—One-Sided Feature of Commission Regulation

BY THEODORE P. SHONTS
President Interborough Rapid Transit Company, New York, N. Y.

THERE are three cardinal principles for the establishment of which we must aim in our studies of the problem of capital and labor. These principles are:

1. In any conflict between the managers and men of a public service corporation, the rights of the public are paramount.
2. There can be no permanent benefit in the triumph of either labor or capital in such a conflict, if the struggle leaves scars and wounds or bad blood. Unless good-will based on justice and right is restored and made permanent, the struggle is a loss for all.
3. Nothing must be done to impair any of the fundamental rights belonging to any man to work—or not to work—for or with whomsoever he will, and under conditions satisfactory to himself.

Public service is unlike ordinary commercial industry in ways that make the relationship of capital and labor engaged therein peculiar to itself. Unique responsibilities grow out of certain special conditions in public service. For example, the public service corporation is responsible to the public for continuity of service. Moreover, it is regulated by public service commissions which control rates but have no responsibility for its expenses. Lastly, a dollar once invested in a public service undertaking cannot be withdrawn; the business must go on.

RESPONSIBILITY OF THE PUBLIC

The public has its special responsibility. It must recognize the rights as well as the duties of employers and employees which grow out of service to it. The public service corporation has a moral, legal and financial responsibility to the community, while the workingman of that corporation at present has no enforceable responsibility to the community. Have we not come to a time when it is necessary to make the employees of a public service corporation responsible to the public just as we make those responsible who invest their money in a public service undertaking?

No man is compelled to invest his money in a railroad or an electric light company; but the public says that, once he has so invested, he must allow the conduct of his investment to be regulated in the public interest. No one is compelled to accept employment with a public service corporation, but if a person does enter the employ of such an institution, ought the public not to say to him: "You cannot join with your fellow workmen in interrupting the public service. The old way of 'fighting it out' cannot, in the interest of the public, be permitted. You have entered upon the public service with a responsibility that you must recognize."

If it be said that this means "interference with personal liberty," I reply that civilization itself is in great part a system of wise restrictions of unbridled personal liberty. We gladly sacrifice portions of our personal liberty for the public welfare, and that demand, after all, is the supreme social law. No matter what plan be ultimately adopted, it need not involve "involuntary servitude" on the part of the employee if he desires to cease work. A way can be provided by the public for filling the man's place competently, and that being done, but not before, he may go elsewhere.

Any law must be fair to all concerned. It should, of course, not be possible, for instance, for a corporation to discharge, without reasonable notice, public service employees collectively or to reduce wages or make a general change, arbitrarily, in hours of labor or of working conditions affecting the whole body of employees or a substantial proportion of that body or of a particular class thereof. In short, if strikes are to be restrained in the public interest, for the same reason lockouts should also be restrained.

It has been proposed that the law provide that an agreement be made for a definite period wherein the employer would agree not to make any collective changes except after the expiration of, say, sixty days' written notice. It might also require the employee to agree not to quit work until after the expiration of the same period after written notice of his intention to quit. These are only suggestions current in public prints. I am not debating them.

INCORPORATION OF LABOR UNIONS

The suggestion is under discussion too that labor unions be incorporated in order that they may be held to financial liability in the case of violation of agreements. The fact that this is so widely discussed gives it a standing that calls for just and wise decision. It cannot be ignored. The same may be said, if no more, on the proposition that neither strike nor lockout be permitted until some impartial tribunal, acting on behalf of the public, shall have time to investigate thoroughly all the facts, and report these facts to the public.

The honest belief of many working men that arbitration is likely to fall under the control of men whose life activities bend their sympathies and psychology toward the employers, must be candidly met. There must be absolute fair play, and a conviction in all that the play is fair. One thing is sure—no corporation and no business can profit unless its men feel that they are getting a square deal. We must not only treat our men well, but we must make them feel and know that they are being treated well.

One of the great troubles incident to our large business organizations is the difficulty of men and managers getting together. If they did get together, they would know each other better and understand one another's motives and purposes. The approach to a real and permanent solution of the industrial problem must lie in deeper recognition of the fact that those who direct corporate activity are no less human than those who perform manual labor.

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*Abstract of address delivered before the Illinois Manufacturers' Association at Chicago on Dec. 7.

Fundamentals of Traffic Routing

In His Recent Report on Rochester Traffic Conditions B. J. Arnold Outlines the Principles of Scientific Routing and Describes a Novel Plan for Determining Natural Lines of Travel in an Industrial Community

AT the request of the Chamber of Commerce of Rochester, N. Y., Bion J. Arnold recently made a study of routing, car operation and general service conditions in that city. He presented a report thereon on Oct. 26, 1916, a statement regarding which appears on page 947 of the issue of the ELECTRIC RAILWAY JOURNAL for Oct. 28. While the detail findings of the report are of local interest largely, it contains many interesting statements of underlying principles. These together with a few Rochester data selected for purpose of illustration are given in the following paragraphs.

SUMMARY OF PRESENT CONDITIONS IN ROCHESTER

The report states that the city of Rochester should provide a profitable field for street railway operation. Its population density is comparatively high, the business section is centrally located, and the city has a consistent record of fairly rapid growth. The present rate of return earned on the street railway investment, together with the probability of continued future growth without competition and present earnings per capita of approximately $14, should put the railway company in a financial position to make all improvements reasonably required.

The problem now presented not only concerns present conditions, but also provision of facilities adequate to accommodate future growth of street railway traffic. The number of passengers carried daily has been increasing from 80 to 90 per cent per decade, and downtown rush-hour traffic at an even greater rate. At present, the difficulty with service is more the result of lack of adequate street facilities in the downtown section and lack of improved operating methods than of faulty routing and failure to operate a sufficient number of cars.

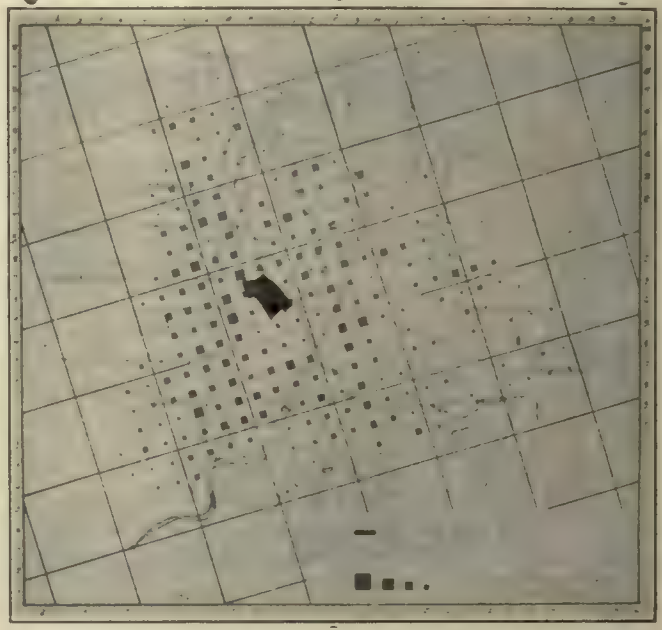
With one possible exception the present routing plan serves the city as a whole nearly as well as could be expected with present track facilities, considering the limitations imposed by the downtown street layout. The complete through routing of all lines is especially commendable. Routing of lines on Main Street has been so arranged that there are practically no curve movements between State and Elm Streets, which is very desirable from the viewpoint of operation and car handling capacity.

Data which were collected show community of interest between the sections of the city and indicate that, as a whole, the routes are reasonably well laid out, although there are certain additional connections which appear desirable, such as lines from the southeast to the southwest and northeast sections of the city.

It should be understood, however, that it is difficult if not impossible to serve every community of interest, at the same time avoiding congestion on Main Street and providing the proper balance between the two ends of through routes, which is essential from an operating standpoint.

The outstanding defect with the present routing is its entire lack of crosstown facilities in all sections of the city. It is recommended that such routes be installed. Such crosstown facilities, in addition to the increased convenience to patrons, will serve the double purpose of decreasing the length of haul and removing crosstown traffic from the congested district.

In view of the lack of river bridges on the north side adequate for street cars, operation of a proposed motor bus crosstown line, if suitably extended, should be reasonably satisfactory. However, such buses should be operated on the same basis as street cars, without charging an extra fare, or the advantage would be largely lost. In a city territorially as small as Rochester, and with its favorable street railway conditions, a 5-cent fare with universal transfers should be expected. Such crosstown lines should be a source of considerable additional revenue derived from persons who now walk across town, especially in rush hours.



ROCHESTER TRAFFIC CONDITIONS—SAMPLE CHART SHOWING RESIDENCES OF INDUSTRIAL EMPLOYEES

(Solid squares show density to scale. Dark irregular area represents industrial district in which the workers are employed.)

Taking the traffic counts made by C. R. Barnes last year as a basis, it appears that as a whole during rush hours the railway is providing better service than is given in a great many other American cities as regards the proportion of seats operated to passengers carried at the maximum traffic point. The fact that loading on individual cars is sometimes excessive is probably the result of headway distortion rather than failure to operate sufficient cars.

In a city of the size of Rochester there are certain operating limitations which do not exist in a smaller community. Obviously it is impracticable for all cars to operate on or to cross Main Street. Also, too frequent stopping places result in low speed and irregular headway, and patrons should not object to a stop spacing in residence districts of from 400 to 500 ft. Cars should not be expected to wait or make more than one stop at a given locality to pick up passengers, as traffic density has reached the point where "double-berth" or tandem operation is necessary downtown, and a car stopping in the second loading position should not be required to stop again at the first position.

Following the general statements abstracted above the report contains a number of detailed suggestions regarding conditions on the city lines. On the interurban situation it says that there is a pressing need for adequate interurban terminal facilities away from the streets used by urban cars. The present practice of using these streets as a station and for switching cars constitutes a serious interference with both street and local car traffic. One of the possibilities of the old Erie Canal right-of-way is for the development of an adequate interurban entrance and terminal.

GENERAL CHARACTERISTICS OF ROCHESTER AND ITS TRAFFIC CONDITIONS

Rochester is a comparatively symmetrical city with the business, geographical and population centers very close together, which, from a street railway viewpoint, is advantageous, since the average passenger haul is less than if business and population centers were widely separated.

ROCHESTER TRAFFIC CONDITIONS—CHART SHOWING DISTRIBUTION OF INDUSTRIAL EMPLOYEES

The area of the city is approximately 24 square miles, and in 1915 the census showed a population of 248,465, which, excluding the area of the 1916 Charlotte annexation, represents a density of about 18.8 people per habitable acre. For a city of 250,000 inhabitants this is a fair density, which again should make for short haul and profitable street railway operation.

The city is divided by the Genesee River, which presents a serious barrier between the east and west sides, particularly from a transportation viewpoint. Excepting in the downtown district, there is only one bridge within the city limits. On the south, at about the present city line, a range of hills presents a barrier to growth, although outlets are available for the Monroe and South Avenue car lines. A similar barrier is presented on the southwest by the new barge canal, but much vacant territory is still to be settled in that direction.

The street railway system of Rochester comprises 59.78 miles of line, all but 4.23 miles of which is double track. The radial plan has been followed, and at the present time the tracks occupy practically all the more important radial thoroughfares. No crosstown lines exist, although the system is much in need of such lines.

Several suburban and interurban railways focus at Rochester: the Buffalo, Lockport & Rochester Railway entering over Lyell Avenue; the Rochester, Syracuse & Eastern over University Avenue; the Rochester & Eastern over Monroe Avenue, and the Rochester & Sodus Bay over East Main Street. In addition, lines to Charlotte, Sea Breeze and Summerville are operated in connection with the local service.

During the period from 1906 to 1913 inclusive there was an average annual increase in the local street railway revenues of nearly 8 per cent. In the two following years, due to the business depression and competition of jitney buses, the revenues decreased an average of 5 per cent a year. Taking the passenger traffic in March as indicative of the fiscal year 1916, the revenue this year would amount to $3,540,000, representing an increase during the ten-year period since 1906 of 82 per cent. During the same period population increased only 37 per cent. As earnings usually increase as the square of the population, this would call for a revenue increase of 87 per cent, slightly more than has actually taken place. During the eight years preceding 1914, however, earnings increased faster than this so-called "law of the squares."

Assuming that Rochester keeps up its past rate of growth for another decade, and that rush-hour traffic increases only 75 per cent as fast as the total earnings, the present downtown streets now available as thoroughfares under present routing would probably be called upon to accommodate 60 per cent more traffic than at present, which would create intolerable congestion, even with the most efficient traffic regulation and car operation. With such improved operating conditions, the present volume of traffic should cause no difficulty. Future increase can fundamentally be provided by three methods:

1. Provision of additional downtown traffic arteries.
2. Diversion of traffic from the central district by the construction of crosstown lines.
3. Rerouting so as to turn cars back before reaching the central district, or divert them from the business section.

Of these only a combination of the first two will furnish reasonably permanent relief.

GENERAL PRINCIPLES OF ROUTING

Routing calls for much co-operation and mutual concession on the part of the riding public. Undoubtedly the greatest convenience to the shopping public at present would result if all lines were routed over Main Street. Limited track capacity on Main Street, however, compels diversion of some of the routes, and in view of the importance of this street first consideration should be given to an arrangement of routing which will tend to eliminate congestion thereon.

Through routes should, as far as possible, connect districts having a community of interest. Thus routes connecting two manufacturing sections or two important parks are not as desirable, other things being equal, as routes connecting a residence and a manufacturing district having a common interest, or a residence district and a park.

The two ends of a through route should have about equal density of traffic, particularly during non-rush hours. During rush hours, unbalanced traffic may be cared for by cars looped back or split between two otherwise independent routes if necessary. However, on general principles, every route should operate over the same line throughout the day unless distinctly signed otherwise.

Curve movements in and out of congested streets should be avoided as far as possible, particularly since clearance special work has not been provided in Rochester. Such movements take nearly twice as much time at an intersection as a straight through movement.

Indirect routings should be avoided. Likewise, whenever possible, routes should be brought directly into and out of the central district so as to permit transfer to other routes without carrying passengers needlessly out of their way.

Facilities should be provided for handling passengers traveling from one outlying district to another, without bringing them downtown—*i.e.*, by means of crosstown lines.

Obviously in a city with comparatively few downtown streets all of the above ideal conditions cannot be met. The street layout and the necessity for avoiding congestion on Main Street interpose too many limitations. Therefore some undesirable features must be endured in the interest of an otherwise good plan.

In view of the relatively large amount of traffic originating at the various industrial plants, stores and office buildings, it is desirable that routes be so arranged as to provide direct transit between these establishments and the residences of employees, if there is a marked community of interest between any particular residence district and any factory district.

To obtain data showing such traffic movement, a canvass was made of the more important business establishments, it being requested that employees fill out slips prepared for the purpose of showing their place of employment, place of residence and, in the case of riders, the car line used and any suggestions as to improvement in facilities. From these inquiries approximately 22,800 returns were obtained. These were charted as shown in sample diagrams such as reproduced on pages 1238 and 1239.

As a general rule, the indications are that many industrial riders are nearly as well served as is possible with present trackage, but there are certain districts showing a marked community of interest which are not directly connected.

Application of Fundamental Principles of Loading, Schedules, Etc.

After discussing general principles such as those abstracted above, the report takes up in detail the different routes and analyzes each in the endeavor to show the extent to which it meets the requirements. The concluding part is taken up with questions of loading, headway, car equipment, etc. It was pointed out that although Rochester rush-hour service as measured by relative seats operated and passengers carried is equaled by very few American cities, it does not follow that service on its individual lines could not reasonably be better apportioned or that some cars are not unreasonably crowded. A crowded car followed by two empty ones constitutes poor and inefficient service, even though the total seats exceed the passengers carried. Much of the complaint regarding service can undoubtedly be traced to non-uniformity in car loading, which in turn is due to irregularity of headway and failure properly to proportion service to traffic. Therein probably lies the most effective means of bettering service conditions.

Counts made in Rochester show that during the evening rush-hour period of ninety minutes, although 3 per cent more seats were provided outbound than there were passengers carried, nearly 18 per cent of the passengers were standing. As no excessive peaks exist within the ninety-minute-rush period, there should be no difficulty in scheduling cars closely to follow traffic variation.

Regarding gaps in service, an analysis of data from the 1916 Barnes report showed that for eleven routes the aggregate delay observed amounted to from 7 per cent to 30 per cent of the rush-hour period. Delays due to bridge openings were shown by the company's report to be quite serious, causing an average of about one hour per day per route. Delays due to defective equipment caused about forty minutes' delay in addition to 1.9 trips lost from the same cause. Broken trolley wires caused delays aggregating one-half hour per day. Of the total of 253 minutes' delay per day, 105 were due to cars off the track, defective equipment and to a certain extent broken trolley wires.

The records show that 6 per cent of the winter cars had to be changed each day in winter and 4.5 per cent in summer. This was considered to indicate that some of the equipment was too old to render satisfactory service or that the standard of maintenance was insufficient, particularly in winter. Old types of cars required changes of 9.6 per cent per day in winter and 8.4 per cent in summer, or nearly twice as frequently as the more modern cars.

The report listed as other possible causes of headway distortion the following: Vehicles failing to leave the car track on signal, faulty power supply, congestion, excessive number of stops, excessive car loads, poor car operation, lack of proper supervision and dispatching, lack of sufficient layover at termini to adjust schedules, mixed equipment not having uniform speed, and short headway on single-track lines.

Of the above some are quite beyond the control of the operating company, particularly track obstructions and vehicular traffic. In Rochester it is understood that snow is not removed from outlying streets except from the tracks, being simply swept to the adjacent roadway. Such practice causes vehicles to follow the track, makes it difficult for them to turn out and inevitably results in irregular headway. This condition is obviously a responsibility of the municipality.

Under present conditions a late car picks up more passengers than usual, the delay in loading making it still later, with a result that such a car is soon crowded with passengers. The use of a "Car Full" sign, although not popular in American cities, remedies this condition somewhat. The adjustment of the schedule of a car ahead of time by slow running on a track used in common with several other routes is a cause of irregular headway on other routes using that track. Cars on Main Street were frequently observed to creep along at half or quarter speed, thus holding up several cars immediately following. Such practice on the part of motormen should be strictly prohibited.

On the subject of schedule speed, the report states that the average is 8.73 m.p.h. as compared with 8.6 m.p.h. in 1911. This is considered low in view of the fact that as high as 9 to 10 m.p.h. is attained in other cities. The railway is commended for having made a good start in the elimination of a large number of stopping points during rush hours, but it is recommended that many of these be abandoned at all times. In residence districts a stop spacing of 400 ft. to 500 ft. is reasonable if applicable to existing block lengths. Where blocks are very short, or where streets offset, it is not necessary to stop at every intersection. It is further recommended that present far-side stops be replaced by near-side stops, for, as safety requires a car to slow down and sometimes stop at approaching an intersection, the near-side rule has the advantage of utilizing this slow-down or stop, which makes for increased schedule speed. The principal advantage of the far-side stop is that with equipment used up to recent years it is possible for passengers to board and alight at the crosswalk during bad weather. In the case of center-entrance cars or trailers, however, this advantage is entirely lost, while the new end-entrance, center-exit cars, the near-side stop has the advantage in that passengers can board the cars at the crosswalk. Also the present practice of educating passengers to use the forward-exit permits them to alight at a crosswalk with the near-side stop.

Such congestion and delay as now exists in Rochester is largely the result of the following causes: Lack of clearance curves, slow loading speed of cars together with heavy passenger interchange, imperfect traffic regulations at intersections, lack of multiple-berth operation, slow braking and acceleration of cars, and low speed across intersections.

Acceleration and braking rates, which determine the time required for a car to enter and clear a loading berth, have an important bearing on capacity. Observations made in Rochester with a special instrument recording acceleration and braking rates showed that the practice in this respect could be improved. Both rates averaged about 1 m.p.h.p.s. to 1.25 m.p.h.p.s., whereas in the downtown district rates of 1.5 m.p.h.p.s. to 1.75 m.p.h.p.s. should be attained, and outside of this district a rate of about 2 m.p.h.p.s. A marked failure was noted on the part of the motorman to approach a loading berth at fair speed before braking. The tendency is to creep into the loading position particularly if there is a car ahead. With double-berth operation this tendency would be removed.

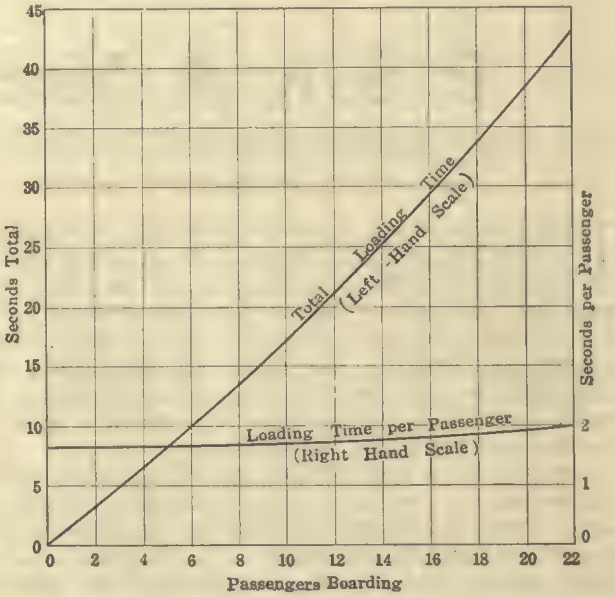
Traffic Regulation

Where any considerable density of car traffic is encountered the efficiency of street traffic regulation not only at intersections but also that governing parking of vehicles has a very marked effect upon operation, in fact the capacity of an intersection for handling car traffic may be in a large degree fixed by the efficiency of the traffic officer in charge. In Rochester observations of the signal interval during which crossings are kept open in each direction shows an attempt to clear one street entirely before opening the cross street for traffic movements, resulting in signal intervals which are frequently over a minute in length. As a general rule it is believed that conditions would be bettered by shortening the average interval to approximately thirty seconds, which is about the time required for passing two cars over an intersection in tandem operation. With shorter intervals their frequency would be greater and thus the time available for vehicle traffic in each direction would not be changed, whereas the delays at each intersection would be reduced and the capacity for car movement materially increased.

The report states that on wide streets, such as State Street and Main Street, the loading of cars was delayed because passengers usually had to find their way from the curb to the car among vehicles of various kinds. It was recommended, therefore, that safety zones be reserved on these streets approximately 100 ft. in length. Such zones encourage quick loading and remove the objection to double-berth operation. In addition, parking of vehicles on congested streets should be prohibited during mid-day hours within two car lengths of the near side of an intersection, for a time longer than that required to load or unload. Parking of freight vehicles should be entirely prohibited in the congested districts during rush periods.

Reference is made to certain ordinances governing car operation in Rochester, some of the provisions of which would work a hardship to the operating company and its patrons if enforced. For example, the 7 m.p.h. downtown speed limit would result in poor service, whereas street cars operating on a fixed roadway and under power-brake control should not be so limited as to speeds. Cars passing a standing car headed in the opposite direction are now required by ordinance to come to a full stop. It is believed that ordinary caution, such as a limited speed and ringing the gong should be sufficient in such cases. A rule prohibiting street cars from coming within 10 ft. of another car or vehicle at any mid-block cross-walk seems entirely unnecessary. There is no reason why such a limitation should apply to cars any more than to vehicles, as its enforcement would create additional congestion and delay.

In connection with the time of loading, the report calls attention to the fact that on the non-prepayment cars the loading time is greater than one and one-half seconds per passenger, and on the prepayment cars it is one and eight-tenths seconds to two seconds exclusive of the time required for opening and closing doors. While the slowness of the passengers and their failure to have exact fare ready is partly responsible, the design of the platforms and the constricted passage is the most important factor.



ROCHESTER TRAFFIC CONDITIONS—LOADING SPEED ON PREPAYMENT CARS

On the few pay-within cars now operated by the company, loading speeds as high as one second per passenger were observed The new end-entrance, center-exit, pay-as-you-pass-the-fare-box cars, of which the company has now fifty on order, should load very rapidly. In fact, the delay if any will probably occur at unloading points, although this should not be serious.

Car Storage Facilities and Line Extensions

In view of the objections which have been raised to the location of the downtown car house on State Street, the recommendations of the Arnold report are of interest. At present there are twenty-two ladder tracks branching directly off the southbound State Street track into this house, which cuts up the southbound roadway and is a source of delay to car and vehicular traffic. The company's plan to remodel and extend this carhouse is approved, except that one or more exits in addition to that on State Street are recommended. The company now plans to make this a double-end house with entrance tracks from Plymouth Street and extra tracks to State Street, with a "run-around" track from State to Frank on Commercial Street. The retention of the downtown house is approved, but it is suggested that as additional car houses are built in outlying sections, it should be used simply for storing tripper cars of many routes. By this means inbound trippers can be stored in the central district, ready to handle the evening rush-traffic promptly and with minimum dead mileage.

In making extensions into outlying districts, it is recommended that the radial plan be followed exclusively and that if routes are split both branches be radial. Crosstown lines serve a very definite purpose, but they should be constructed as such and not mixed with radial lines.

While probably the most desirable improvement in street railway facilities in Rochester is the construction of crosstown lines, few if any logical routes for such lines are now available due to the lack of bridges over the Genesee River. The report then suggests a number of suitable extensions of existing lines.

In conclusion, it is considered that the investment in city property of $3.26 per dollar earned per year is a reasonably low-investment ratio. The annual expenditure from maintenance depreciation of 13.9 per cent of the gross earnings is comparatively low for an urban property. Allowing 18 per cent for this purpose, and excluding certain debatable charges, there would have remained a net return of about 7.7 per cent on the investment in city property. This is not in excess of what has been allowed by commissions in similar cases, nor is it below what might be expected for a developed system holding a virtual traction monopoly. Thus even with a comparatively low investment ratio, the present service provided by the company would not leave a margin in net revenue sufficient to justify a very large additional expenditure without a corresponding decrease in the quality of service rendered.

P. S. R. A. Meets in Philadelphia

First Day's Speakers Discussed Insurance Topics—Papers the Second Day Covered Lightning Protection, Electric Welding, Taxation and Jitneys

THE main subject of discussion during the first day of the Pennsylvania Street Railway Association's convention in Philadelphia, Pa., on Dec. 12-13 was insurance, this being taken up from the general points of fire insurance and prevention, life insurance, and accident and casualty insurance. On the second and concluding day the program was more varied, for the topics included lightning protection, electric welding, taxation and the status of the jitney.

The convention was formally opened at a short morning session on Dec. 12 for the transaction of routine work. President Thomas A. Wright, vice-president and general manager Wilkes-Barre (Pa.) Railway, made a short address in which he recommended the appointment of a legislative committee whose function it would be to keep the association informed as to commission rulings, new laws and the like.

The Session on Insurance

The afternoon of Dec. 12 was devoted to the consideration of the various phases of insurance before mentioned. The first subject, fire insurance and prevention, was introduced in a novel way by H. W. Forster, general manager Independent Inspection Bureau, Philadelphia, Pa., assisted by C. L. S. Tingley, second vice-president American Railways, Philadelphia, Pa. These two presented an entertaining playlet, laid in the office of the general manager (Mr. Tingley) of the "Toonerville" Traction Company. The occasion was the presentation to him, in a twenty-minute interview, of a preliminary inspection report on the property. This interview brought out various practical points regarding the prevention of fires and of their spread.

For instance—to strip away all the theatrical framework—Mr. Forster first reported on the general subject of railway housekeeping, mentioning the collection of waste in pits, under benches and behind radiators. He recommended that the cleaning question be put up to the men for better co-operation, and he suggested ample bins for storing clean waste and also facilities for storing refuse until hauled away. In regard to conduit installation, he said that the fire hazard in main cables is not great, that conduit is expensive, may get moisture in it and is difficult to put into old cars, although it might be a different proposition for new cars. He spoke also of the advisability of keeping trolley poles down in the car-house, and of putting in a generous lighting system so as to make it unnecessary to keep the cars illuminated except when cleaning inside. In regard to pit illumination, Mr. Forster suggested for old pits conduit wiring run under the stringers supporting the track, with right-angle protected reflectors to throw light under the cars. Moreover, the care of inflammable liquids could be improved by keeping the gasoline supply in an oil house, by providing a cover for dip pans and by moving these away as far as possible from iron-heating furnaces.

On the subject of preventing fire spread, Mr. Forster mentioned the advisability of tearing out partitions preventing the easy entrance of fire hose, of removing wooden side wall sheathing that will carry fire from floor to ceiling, of using expanded metal partitions to allow free sight as well as easy play of fire streams, of eliminating unnecessary openings from a fire wall and equipping the other openings with standard fireproof doors, of having broken windows repaired promptly and of installing an automatic sprinkler system. It was said that the fire record of automatic sprinklers is exceedingly good, and such devices are rapidly being installed and very favorable insurance rates are almost always granted. If an entire sprinkling plant cannot be afforded, the car house should be equipped first. Furthermore, Mr. Forster said the hand extinguishing equipment should be kept in repair and the men should be instructed as to its proper use. Fire drills are also very important. Accidents to cars and derailments may properly be feared at such times, Mr. Forster thought, but he had seen very effective drills in which no damage was done and which undoubtedly would be of value in the case of actual fire.

In the ensuing discussion of the points raised, E. W. Bowman, supervisor of insurance Philadelphia (Pa.) Rapid Transit Company, emphasized the advantage of fire drills for electric railway employees. He mentioned how in one instance fire drills had made it possible for thirty-six cars to be taken out in four minutes without any derailments. Mr. Tingley said that a fire organization was just as essential as any other part of an electric railway system. There should be a fire chief, who had been taught what to do, and under him employees trained to obey. President Wright also thought that such a system was advantageous.

The second paper in this group was by Mr. Bowman, on "Co-operation in Fire Insurance." This will be abstracted in a later issue. After this, Mr. Forster described the work of the Underwriters' Laboratories, illustrated with excellent moving pictures taken in the main testing station in Chicago. He told how the laboratories make tests of samples, how they follow these up to make sure that the manufactured articles do not fall below the standard, and in general what the inspection label of the laboratories means. The pictures furnished by Mr. Forster showed in an interesting way some of the tests that are applied to fire-fighting apparatus, electrical apparatus, wire glass, safety doors and the like.

The remaining papers at this session included one on life insurance, *i.e.*, "Group Insurance for Electric Railway Employees," by W. F. Chamberlain, superintendent of group insurance division Travelers Insurance Company, Hartford, Conn., and three on accident insurance. In the latter group was one on "Precautions Against Accidents," by A. G. Jack, claim agent Southern Pennsylvania Traction Company, Chester, Pa., as well as one on "Public Safety Crusades," by Beatrice V. Clinch, the "Safety-First Lady" of the Philadelphia (Pa.) Rapid Transit Company. These will be published later in abstract form. Miss Clinch's paper was accompanied by stereopticon views used in her work in the Philadelphia public schools. The third accident insurance paper was by M. S. Bowman, accident and casualty department Travelers Insurance Company, who described the methods used in compiling manual rates under new compensation laws, and also explained how the average premium dollar to stock companies is used, as follows: Claims, 60 cents; taxes and licenses, 2.5 cents; accident-prevention service, 4 cents; investigation and adjustment of claims, 7 cents; general administration, 9 cents, and acquisition expenses, 17.5 cents.

A few special remarks upon the growth of the power of public opinion in this country and the general subject of electric railway publicity were then made by G. Henry Payne, New York, N. Y., and the meeting was adjourned.

An informal dinner was given on the evening of Dec. 12 by the association at the Hotel Adelphia, where the meetings were held. Part of the entertainment consisted of a series of moving pictures showing various electrification projects, these being furnished through the courtesy of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

THE FINAL SESSION

The convention was closed with a session on the morning of Dec. 13, the first paper being one on "Arc-Welded Track Joints," by E. A. Hoffman, engineer of way, Wilkes-Barre (Pa.) Railway. This is abstracted elsewhere. In reply to a query, Mr. Hoffman added the fact that a current of 150 amp. is ordinarily sufficient for electric welding of rail joints. The current varies with the character of the rails, but 200 amp. would be the usual maximum. President Wright said that his company had been much impressed with the results obtained in Wilkes-Barre.

Lieut.-Col. Chauncey B. Baker, U. S. A., had been scheduled to present an address on "The Use of Electric Railways in Pennsylvania in Connection with Mobilization and National Defense," but owing to unforeseen duties requiring his presence in Washington he was unable to be present. Three other papers, however, were read, as follows: "Taxation," by Boyd Lee Spahr, attorney, Philadelphia, Pa.; "Lightning Protection," by E. G. Newton, General Electric Company, Pittsfield, Mass., and "Status of the Jitney," by D. I. McCahill, general counsel West Penn Railways, Pittsburgh, Pa. These appear elsewhere in abstract form. Mr. Newton's paper was illustrated with stereopticon views showing various types of lightning arresters and points in connection therewith.

The only paper followed by discussion was that by Mr. McCahill. W. E. Boileau, general manager Scranton (Pa.) Railway, said that 130 complaints against jitneys operating illegally had been filed with the Public Service Commission. There are sixty-eight jitneys still operating in Scranton, according to the last check made, but only thirty of these are included among those against which complaints have been filed. He also mentioned the fact that some of the jitneys are being equipped with tops and claim to be heated so as to make a bid for winter business. President Wright stated that 240 complaints had been filed against Wilkes-Barre jitneys and that thus far fifty decisions against the jitneys had been handed down by the commission. He felt that the great problem is to find a way of following up and enforcing the commission orders.

J. Ralph Baker, attorney, Harrisburg, Pa., said that the railways had a very good chance to protect themselves in courts of equity against illegal competition and that the jitneys might be curbed by securing injunctions and laying the jitney owners open to contempt proceedings. While there are no legal decisions in Pennsylvania exactly along this line, he cited the case of one electric light company that has been prohibited by injunction from attempting to do business without the permission of the Public Service Commission. Mr. McCahill, however, thought that the ideal plan would be to have a law like that in Wisconsin, making illegal jitney operation a misdemeanor punishable by a fine, with imprisonment for non-payment. He was not sure whether such a law could be passed in Pennsylvania, but he did believe that the Public Service Commission should have the power to go into local courts in criminal proceedings to enforce its rulings. He also thought that a general commission order covering all jitney operation would have a good influence.

Mr. Tingley said that the association was confronted with two important questions—the first referring to the enforcement of jitney rulings of the commission and the other to the advisability of presenting at the next Legislature a bill authorizing electric railways to operate motor buses. J. A. Keppelman, attorney Reading Transit & Light Company, Reading, Pa., was of the opinion that the jitneys had brought into prominence the question of motor-bus operation by electric railways, and it would be an advantage in the future if they at least had the power to operate such auxiliaries. Morover, legislation to this effect would be a good influence for the enforcement of commission jitney orders. It was finally resolved that the executive committee or a special committee draft a special bill, authorizing the operation of motor buses by electric railways, to be presented to the next Legislature. The association also adopted President Wright's suggestion of a legislative committee of three members to keep the association informed along commission and legislative lines.

The next subject on the program was an open discussion on economies made necessary by present day problems in labor and materials, but there were no participants. The question box also evoked little discussion. W. A. Heindle, general superintendent Southern Pennsylvania Traction Company, Chester, Pa., thought that the time was ripe for securing the needed increase in fares for electric railways by raising the fare to 6 cents or charging 1 cent for transfers. Mr. Tingley said that a recording watt-meter used by one of his companies had cut down the cost of power and also the cost of maintenance because the employees now turn cars in just as soon as anything goes wrong. Mr. Hoffman stated that oxy-acetylene welding is too slow for economical use on track work, but that it is good for lighter work, sheet metal, etc. F. R. Phillips, superintendent of equipment Pittsburgh (Pa.) Railways, testified that the oxy-acetylene process is advantageous in making joints in fine sheet metal and for cutting rails and bars where an exact alignment is desired. For scrap and all material where no exact cut is needed electric welding is quicker and more economical.

The nominating committee then reported the names of all the existing officers and members of the executive committee for re-election, and these were approved. A proposal was then read to the effect that the association hold one regular annual meeting each year in May at the call of the executive committee. It was stated that under the by-laws this could not be acted upon until the next meeting in May, and the convention was then adjourned.

Arc-Welded Track Joints

The Author Points Out the Advantages of Welding Joint Plates to Rail Head and Base for Both New and Repaired Joints

BY E. A. HOFFMAN
Engineer of Way Wilkes-Barre (Pa.) Railway

ON the Wilkes-Barre Railway varied results have been obtained in building up battered special work by the electric arc. Ordinary built-up or cast-steel special work has been very successfully welded, but in the matter of welding manganese steel the chances of success and failure are about equal, and no amount of care seems to alter the chances. Manufacturers of manganese steel special work assert that this material can only be successfully welded if, after welding, it is subjected to heat treatment, and from three years' experience we are inclined to think that such is the case. For special work already installed this, of course, is impracticable.

The principal work for which our arc-welding outfit was used for the first three months was the building up of cupped joints which, after welding, were ground to a smooth running surface. But it was found that surface welding was only a temporary remedy for this defect, and the cause of the trouble, which was worn or loose joint plates, remained. Our present practice is, therefore, to weld the fishing surfaces of the worn plates sufficiently to keep the plates well away from the web of the rail and to grind to a good fit on both rails. After replacing the plates they are welded to the rails along the top and bottom edges whenever possible. The rail surface is then welded and ground. Joints repaired in this manner are still in excellent condition after two years of service on sections of track which, before being thus repaired, were sources of continual annoyance and expense.

In connection with the basic causes of such defective joints it may be said that in practically every mechanical joint there is a slight separation of the metallic surfaces of the rail and joint due to the presence of rust or mill scale or other poor conductor. Now if the copper bond joining the rails is insufficient or becomes defective, the return current will pass through the joint plates and may set up electrolytic action at the junction of the rail and plate surfaces. Defective bonds have been attributed largely to poor joints. May it not be that poor joints are caused by defective bonds?

To the same end it is safe to say that almost any modern mechanical joint is amply strong to carry the loads that pass over it. Its failure from purely mechanical causes is not due primarily to the weight which it has to carry, but to a movement of the parts that make up the joint including the rail. A perfectly-fitting joint is rare, and the effect of this is that when the plates are drawn up tight on one rail they are a trifle loose on the other. Although this looseness may be almost imperceptible, it does permit a slight vertical motion of the rails.

This rail movement causes the abrasion of the bearing surfaces of the plates and the adjoining rail, thereby permitting greater movement of the parts and may permit the receiving rail to be depressed so that the car wheel in passing from one rail to the other strikes with considerable impact, causing cupping of the receiving rail and battering of the top of the fish plate.

Still another cause of joint failure will be found in the stresses upon rails and joints which are produced by changes in temperature and which do not seem to be fully appreciated. The writer believes that this is one of the most important reasons for joint failure and most certainly must be reckoned with in the design of riveted or welded joints. Investigations show that rail temperatures follow very closely those of the air, lagging about 10 deg. Fahr. behind in the extremes of temperature. Assuming 0 deg. and 100 deg. to be the extremes for this latitude, there would be 80 deg. Fahr. as an easily attainable change of temperature in a rail embedded in a pavement. A simple calculation shows that such a change of temperature would produce a stress of 16,000 lb. per square inch of section of a restrained rail. In other words a rail weighing 100 lb. per yard, if laid in midsummer weather, would be subjected to a tensile stress of 80 tons when the temperature was zero.

The ordinary bolted joint will not withstand, nor is it designed to withstand, such a powerful pull, and the result is that the rail slips in the plates and the joint opens in cold weather. This slip does not occur at every joint, for obviously the weaker joints would yield first, thereby relieving the stress in the others. But this slipping has resulted in an abrasive action between the fishing surfaces of the rail and joint, and by frequent repetitions because of lesser changes of temperature, it results in the wearing away of these surfaces and the loosening of the joint.

It is contended by some engineers that the friction of the surrounding pavement relieves joints of the full theoretical temperature stresses. This restraining effect may reduce the width of the opening at joints, but it does not diminish the stress before slipping of the joint occurs, as the stress is caused by contraction of the rail and is therefore present in every foot of the track. That the restraining effect of the pavement is uncertain is shown by the fact that in one instance of record a broken joint in a welded track opened nearly 2 in., which would indicate a free movement of 300 ft. of the adjoining rail.

From the above analysis it appears that a properly-designed rail joint should comply with the following conditions: (1) It should be proof against chemical action; (2) Its conductivity (or that of the bond) should be sufficient to prevent electrolytic action; (3) Movement between the parts of the joint and the rail must be prevented; (4) It should have mechanical strength to resist the transverse, shearing and tension stresses caused by traffic and temperature.

All these requirements can be reasonably fulfilled by fish plates of the same general design as ordinary plain plates, welded along the edges to the rails, although some modification in shape is desirable to facilitate welding and to meet other conditions.

Such a joint could be made practically waterproof, as far as the fishing surfaces are concerned, either by welding the ends or filling the space between the plate and rail with tar or grout, and it would therefore be immune from chemical action. Tests show that such a joint has an electrical conductivity in excess of an equal length of rail. Electrolytic action would consequently be eliminated. The welds along the edges of the plates prevent any relative movement of the parts of the joint. The incipient movement in new joints is easy to restrain if not allowed to develop, but even on old, ill-fitting joints we have had remarkable success in stopping the "working" of the joint by simply welding the top and bottom edges of the plates to the rails.

The transverse strength of a pair of modern plain joint plates is nearly equal to that of the rail, while for vertical shear there is a very large factor of safety, even for the heaviest cars. Temperature changes in a joint thus welded will produce a shearing stress in the welds, and there is a question as to how much weld is required to resist this force.

To meet this question we have evolved from a number of experiments a very simple rule for field use: "The length of weld in inches on each rail should be equal to one-half the weight per yard of the rail." For example, rail weighing 140 lb. per yard, which is the heaviest in general use, would require a pair of plates 35 in. in length. Since 36 in. is quite a common length of joints for rail of this weight, it is apparent that a joint constructed according to the above rule does not require the use of plates of unusual length.

It will be noted that these top and bottom welds on plain plates distribute the stress very symmetrically over the cross-section of the rail. It might be said that we have experienced some trouble from eccentric welding. In one instance, where plates were welded to the base of the rail only, several rails broke during the first cold snap.

It has been argued by some opponents to welded joints that the heat of the weld seriously affects the integrity of the adjoining metal of the rail, and it is pointed out that failures in many welded joints occur just outside the weld partly because of internal stress set up by unequal heating of the rail section and partly to the deleterious effect of the heat. But in the arc-welded joint above described only a small percentage of the cross-section of the rail is affected by the heat of the weld, since experiments show that the effect of the heat of an ordinary arc weld does not extend further inward than about ⅜ in.

On a 100-lb. T-rail with four welds, assuming this maximum depth, less than 10 per cent of the cross-section of the rail would be affected, and as even this affected area still retains considerable strength, it is safe to say that the strength of the rail is not reduced more than 5 per cent.

Track constructed with these modified plain joints can be laid, bolted and surfaced in the usual manner and then welded at convenience after traffic is resumed. This is a valuable feature on single track where traffic cannot be rerouted.

Riveting the joint plates instead of bolting them would of course greatly strengthen the joint, but many companies have not the facilities for economical riveting and we do not consider it essential, as a well-bolted joint will develop considerable frictional resistance in addition to the strength of the welds.

Taxing Electric Railways

Author Points Out Various Taxes Used in Pennsylvania Localities, in the State and in the Nation

BY BOYD LEE SPAHR
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TAXATION of street railway and traction motor companies may properly be classified into three groups: (1) local; (2) State, and (3) national. The purpose of this paper is to state briefly the various kinds of taxes in each of these three groups and to point out their more prominent requirements.

LOCAL TAXATION IN PENNSYLVANIA

Local taxation may be subdivided into tax on real estate, tax on personal property, licenses (which technically are not taxes), and the various requirements in consenting ordinances, which are simply another form of taxation. Real property of street railway companies is not subject to the same rule throughout the entire commonwealth. On the contrary, there is one rule for Philadelphia, another rule for Pittsburgh and a third for the rest of the State. In Philadelphia under an old special act of the Legislature, all real estate of street railway and traction companies is taxed with the exception of power houses, battery houses and converter houses. In Pittsburgh the street railways are even less fortunate, for there an early special railroad act made all real estate of railroad companies taxable except the right-of-way. In all other parts of the State all real estate which is essential to the operation of the franchise is exempt from local taxation.

The only kind of personal property peculiar to street railways which is subjected to a local tax consists of cars in cities of the third class, which are authorized by an act of the Legislature to levy such a tax. It is also lawful to impose licenses on street railways based upon the police power to inspect the condition of personal property, such as cars, poles, wires, conduits and cables. Municipalities, however, cannot impose a tax on such property in the guise of a license fee, which cannot be exacted for the purpose of revenue but only to cover the actual cost of police supervision and inspection.

The remaining kind of local taxation comprises the various requirements in municipal ordinances. These have occasionally taken the form of a tax on dividends; sometimes a tax on dividends in excess of 6 per cent and sometimes a provision for sharing any excess over 6 per cent with the municipality. An annual tax on cars or other property may be imposed as a condition of consent. The usual form, however, is a provision requiring either the paving or repairing of streets, or both. Apart from any provisions in any charter or ordinance, there is a common law liability on all street railways to keep in repair in a manner corresponding to the rest of the street, the space occupied by the roadbed. The charters and ordinances have enlarged this to include, in some cases, a certain number of feet on either side of the rails and in many instances the entire cartway from curb to curb. These requirements are among the heaviest operating expenses which street railways are called upon to bear, and are also those which the public at large least realize or appreciate.

FOUR KINDS OF STATE TAXES

State taxation in Pennsylvania is of four kinds, the charter bonus of one-third of 1 per cent of the authorized capital, the tax on capital stock at the rate of 5 mills on the dollar, the tax on loans at the rate of 4 mills on the dollar and the tax on gross receipts at the rate of 8 mills on the dollar. Corporations of all kinds are subject to the first of these taxes, and corporations of all kinds having loans are subject to the loan tax. It has long been the policy in Pennsylvania, however, to exempt manufacturing corporations from the capital stock tax. It is difficult to see on what principle this exemption should exist. Not only do street railways and other public service companies thus pay a tax from which a more numerous and, in general, a more wealthy class of corporations is exempt, but they also pay a tax of 8 mills on their gross receipts, thus becoming the most heavily taxed class of corporations in the State.

TAXES PAID TO NATIONAL GOVERNMENT

Taxes payable by street railways and traction motor companies to the national government do not differ from those paid by other corporations generally. On Sept. 8, 1916, Congress in amending the so-called war tax or emergency revenue act of 1914 re-enacted an excise tax against corporations with respect to carrying on or doing business. The tax under this new act is not based upon income but is levied at the rate of 50 cents for each $1,000 of fair value of the capital stock, with a general exemption from said value of the capital stock of $99,000. This act goes into effect on Jan. 1, 1917, and the tax under it will be payable during that month for the six months ended July 1, 1917, calculated upon the value of the company's capital stock during the year July 1, 1915, to July 1, 1916. The really interesting feature of the new excise act of 1916 lies in the phrase, "doing or carrying on business," which is identical with that in the old excise act of 1909. Under the old act the query speedily arose whether a street railway which had leased all of its property and franchises to another company for a long period of years was doing or carrying on business so as to be subject to the tax. To the great discomfort of the treasury department, the courts throughout the country have quite uniformly held that such a company is not subject to the tax. The mere fact that the lessor company receives a rental which is distributed among its stockholders as a dividend, that the interest on its bonds is paid by the lessee either directly or through the lessor company, that the lessor may have agreed to the extension or refunding of bonds or have acquired additional property rights or extensions to be operated by the lessee, that the lessor was itself the lessee of other underlying companies and that payment of the rental to such companies was made by the operating lessee to such intermediate company in the first instance and by it turned over to the companies under it, that the lessor company may have exercised the right of eminent domain—these separately or collectively are not sufficient under the decisions to constitute "carrying on" business. There can be only one result as to leased roads under the new excise act. While they will not ultimately be taxable, they will be put to a considerable amount of trouble in paying the tax under protest and taking the necessary steps to get it back. As the doing of business is a mixed question of law and fact in each particular case, there is no way in advance of avoiding the payment.

The other federal tax is the direct income tax first passed in 1913. By act of Congress of Sept. 8, 1916, the law has been re-enacted with considerable improvement in the phraseology, but the tax is now 2 per cent upon the net income instead of 1 per cent. Of all species of existing taxation, the income tax is probably the fairest, provided it is equitably assessed and collected. It is submitted, however, that the exemption to individuals of $3,000 or $4,000, depending on whether the person is single or married, is entirely too high and that instead of doubling the tax on other persons and on corporations, Congress should have lowered the exemption.

Lightning Protection of Electrical Systems

An Outline of the Fundamental Theory of the Subject, Its Application to Everyday Practice, and a Tabular Summary of Lightning Arrester Practice

BY E. G. NEWTON
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WHILE the lightning protection of electrical systems is only one of the problems in the general scheme of adequate protection of electrical apparatus, it is one of the most important. The term "lightning" means to the average mind visible atmospheric disturbances caused by electrical discharges from cloud to cloud or cloud to earth. As applied to electrical lines it includes what may be called external and internal voltage disturbances. These disturbances may directly or indirectly affect the operating conditions by producing destructive voltages.

In general there are four causes for voltage disturbances in an electric circuit, namely: lightning, arcing grounds, switching and resonance.

GENERAL RECOMMENDATIONS COVERING THE SELECTION OF LIGHTNING ARRESTERS FOR RAILWAY SYSTEMS

RAILWAY SYSTEMS	Generating stations	A.c. aluminum arresters	Low-tension buses (0-7250 v.)
			High-tension lines (0-155,000 v.)
		D.c. aluminum arresters	Buses or feeders (0-3800 v.)
	Transmission lines	A.c. aluminum arresters at stations (0-155,000 v.)	
		Overhead ground wire for lines	
	Substations	A.c. aluminum arresters	Incoming lines (0-155,000 v.)
		A.c. multigap arresters	Incoming lines (0-37,900 v.
		D.c. aluminum arresters	Outgoing feeders (0-3800 v.)
			Rotary converters (0-1350 v.)
	Cars and locomotives	D.c. aluminum arresters (0-3800 v.)	
		D.c. magnetic blowout arresters (0-3800 v.)	
	Trolley circuits	D.c. magnetic blowout arresters (0-3800 v.)	
	Telephone lines	Combined fuse, switch and lightning arrester	
		Horn gaps	
		Drainage	

Lightning: Lightning can be divided into two classes —direct and indirect strokes. Direct strokes are not common on lines, as there is less chance of lightning striking an insulated conductor than the towers or any other conducting objects connected to earth. Fortunately the effects of a direct stroke are less than many indirect ones, as they are of such intensity and voltage as to be localized. Before the impulse can travel along the line the insulation gives way and the abnormal energy is dissipated to earth. Hence direct strokes cause interruptions to service, but seldom affect the station apparatus unless the stroke is near the station.

Indirect strokes may be of any intensity or voltage, from the minutest impulse to practically the severity of a direct stroke. This class of disturbance may be induced electrostatically or electromagnetically, or the effects of both of these may be on the line at the same time.

Arcing Grounds: This class of disturbance is most dangerous to the station apparatus of all that affect an electric circuit, due to the fact that the frequency is relatively high and the duration of the disturbance is often a question of minutes, or even hours. An arcing ground is usually the result of damaged insulation. When the line voltage rises to the breakdown value of the defective insulation, an arc takes place to ground, which naturally short-circuits the electrostatic capacity of the wire. This necessitates a complete readjustment of the charging currents on that line, and in fact on the entire circuit. When the voltage on the defective phase falls below the voltage required to maintain the arc across the fault, the arc is extinguished, and the voltage again rises to the value required to re-establish the arc across the fault. This condition continues until the circuit is opened and repaired. The voltages of these disturbances are limited to approximately double potential.

Switching: In closing a switch, thereby connecting a dead line on to a system, we have two conditions which produce disturbances: First, the line must become charged by a wave of energy passing to the extreme end of the line. If the line is open at the end there will be a reflection at this point and the voltage will rise to approximately double value. This wave, after reflection, will pass back and forth along the line until it finally comes to rest as the result of being absorbed in the resistance of the circuit. The second effect of closing a circuit is due to the fact that this circuit represents additional capacity and inductance. If the circuit contains only inductance like a transformer, there would be a rush of magnetizing current if the circuit were closed at zero point of the potential wave. The value of this current would depend upon the saturation of the iron and the relation of the residual magnetism. In like manner, if a circuit contains only capacity there would be a heavy rush of current if the circuit were closed at the maximum point of potential wave.

GENERAL RECOMMENDATIONS COVERING THE SELECTION OF LIGHTNING ARRESTERS FOR ALTERNATING CURRENT SYSTEMS

A.C. SYSTEMS	Generating or substations	**A.c. aluminum arresters**	Low-tension buses (0-14,000 v. High-tension lines (0-155,000 v.)
		A.c. multigap arresters	Low-tension lines (0-14,000 v.) High-tension lines (0-37,900 v.)
		By-pass protectors	Current transformers (0-155,000 v.) Feeder voltage regulators (0-14,000 v.)
		Aluminum arresters Horn arresters	Constant current feeder circuits (0-9000 v.)
	Transmission lines	A.c. aluminum arresters	Stations (0-155,000 v.)
		A.c. multigap arresters	Stations (0-37,900 v.)
		Overhead ground wires	Lines
	Telephone lines	Combined fuse, switch and lightning arresters	
		Drainage coils	
		Horn gaps	
	Pole transformers	**A.c. multigap arresters**	Low-tension feeder (0-300 v.) High-tension lines (0-14,000 v.)

Somewhat similar conditions occur when the circuit is opened, since it is impossible suddenly to change the electrostatic or electromagnetic conditions in a circuit without diminishing or increasing the stored energy. This requires a sudden readjustment, which takes place in the nature of a transient surge.

Resonance: Resonance is a condition which occurs when a circuit containing inductance and capacity oscillates at its natural frequency. Resonant conditions at fundamental frequencies are rare, but at the frequencies that occur at the higher harmonics resonance does frequently occur, particularly in sections of windings of high voltage apparatus.

Before attempting to provide adequate lightning arrester protection for an electrical system there are certain fundamental things which should be considered, such as initial investment in apparatus to be protected, liability of loss of this apparatus, and loss in revenue, penalties and prestige from interruption to service. Lightning arresters should be selected to give maximum protection for a given capital investment. This involves consideration of the arrester unit itself, of its location and connections, and of the method of grounding.

In considering the arrester unit itself, attention must be paid to the fact that electrical transients, whether from external or internal origin, travel along the transmission or distributing lines at the speed of light and must be dissipated to ground in the least possible time without any appreciable flow of generator current and without any after effect on the normal line conditions. As all lightning arresters operate on voltage they are practically independent of the capacity of the apparatus to be protected. This means that the degree of protection afforded by arresters similarly placed is primarily a question of their relative discharge ratios and whether or not the protective circuit is interrupted by the operation of the arresters. The discharge rate of an arrester is inversely proportional to its impedance. From this standpoint of protection, therefore, it is desirable to have the lowest values of resistance. In the well-known aluminum arrester the only resistance to abnormal potentials is that of the electrolyte, which is very low, and consequently this type gives the best protection. In the case of other standard types of arresters it is necessary to add a certain amount of shunt or series resistance to enable the arrester to function properly. Consequently these arresters have a lower discharge rate. In selecting arresters only those should be considered which have the lowest possible resistance that will enable the arrester to properly function and still keep the destructive voltage well below the tested insulation strength of the apparatus being protected.

After the selection of the lightning arrester the next step in the general scheme of protection is the proper location. Theory, tests, and actual operating records prove that maximum protection is obtained only when the lightning arresters are installed as close as possible to the apparatus to be protected. This means that in the case of generating or substations the arresters should be located at the buses, and on the incoming or outgoing feeders; or in the case of pole transformers at the terminal of each transformer. In addition to protection, arresters requiring daily or frequent attention should be located where they can be readily operated and inspected.

Next in importance to proper selection and location of the lightning arrester are the line and ground connections. These must be short and direct to give minimum impedance, for the degree of protection afforded by any arrester is inversely proportional to its impedance, which must necessarily include the whole arrester circuit. Sharp bends or small diameter conductors in the arrester circuit should be avoided. Also in car wiring, wire that carries lightning current should not be placed near and parallel, for any considerable length, to any of the other wiring, to prevent damage being done by an induced charge.

Special attention should also be given to the arrester grounds, which should be so made that they are always in the permanent moisture strata of the earth and so constructed and located that they will be low in resistance and permanent. Arrester grounds should be independent of apparatus grounds which carry power currents, as power currents tend to bake out the grounds with a resulting increase of the ground resistance. It is common practice to select and locate arresters carefully but to neglect the grounds. The resistance of the arrester grounds should be measured at regular intervals to see that they are in normal condition and all connections thoroughly made.

The accompanying outlines cover in general the recommendations for the selection of lightning arresters for alternating current and railway systems and serves as a summary of the subject.

Status of the Jitney*

Although the Jitney Is on the Wane, There Is Need for More Extensive Jitney Supervision to Protect Established Utilities

BY DAVID I. McCAHILL, LL.M.
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IN my search of the English language for a word that would correctly describe the status of the jitney (aside from the use of profane language) I was able to find but one, "outlaw." What I mean by this is that except in very rare instances, the jitneys in Pennsylvania are openly operating in direct violation of the law. There might have been some excuse for the owners of automobiles in Pennsylvania beginning to operate as common carriers without first securing a certificate of public convenience from the public service commission prior to the time the commission decided what has since become known as the Scranton cases, but the decisions in these cases leave no doubt that before any jitney operator can lawfully carry passengers for hire, he must secure such a certificate. There is no more justification for him to begin his operations without such consent than there is for an electric light, telephone or street railway company to begin operation without the consent of the public service commission as evidenced by its certificate of public convenience.

The growth of our communities has been made possible only by having dependable transportation, and the future welfare and growth of all of our communities now depend and always will depend upon adequate and permanent means of transportation. But the jitney operator begins by sucking the life blood of the transportation company by taking away its revenues and profits so that it will be unable to perform its functions to the public. But if this should take place, the jitney could not step into its place and do for the community that which the street car company could have done and, except for the jitney, would have done.

STATES WITH PUBLIC SERVICE COMMISSION OVERSIGHT

I have found only five states that have subjected the jitney to the jurisdiction of the public service commission by express statutes. These are Colorado, Maryland, New York, Rhode Island and Wisconsin. There are fifteen other states, and the District of Columbia, in which the public service commission law is broad enough to cover the operation of jitneys, although the jitneys are not made so subject to any special provision. Of these fifteen states, only five and the District of Columbia have exercised their jurisdiction over jitneys as common carriers. These five states are Arizona, Georgia, Illinois, Pennsylvania and West Virginia. The remainder of the fifteen states, to wit, Connecticut, Idaho, Louisiana, Nevada, North Carolina, Ohio, Oklahoma, Vermont and Virginia, have not exercised the jurisdiction apparently conferred upon the commission to regulate the operation of jitneys.

The other states do not appear to have conferred jurisdiction upon the public service commission to regulate jitney traffic, although in many of them such control has been exercised by local municipalities. Many of these municipal ordinances have been contested in the courts and important principles affecting jitney regulations have been decided. Thus the Memphis ordinance was reviewed in *Nolen vs. Reichman, Sheriff, et al.* in 225 Fed. Rep. 812, also in *City of Memphis et al, vs. State ex rel Ryals* 179 S. W. 631; and P. U. R. 1916-A, 825, also in *Memphis Street Railway Company vs. Rapid Transit Company et al.*, 179 S. W. 635; P. U. R. 1916-A. 834. In these cases the court decided that the operation of jitneys in defiance of statutory requirement of license and execution of indemnity bonds against liability for injuries and in a manner to impair the safety of the public is a public nuisance that may be enjoined by a street railway that suffers material loss of revenue from illegal competition.

Other municipal ordinances which have been interpreted by the court are that of San Francisco in *ex parte Cardinal*, 150 Pacific, 348; P. U. R. 1915-E. 282; Fort Worth, Tex., in *ex parte Sullivan*, 178 S. W. 537; P. U. R. 1915-E. 441, and *Auto Transit Company et al, vs. City of Fort Worth et al.*, 182 S. W. 685, and P. U. R. 1916-C. 565; Huntington, W. Va., in *ex parte Dickey*, 85 S. E. 781.

Except in special cases, the jitney is on the wane. Its future, in this State particularly, seems to be confined to operation in good weather in and near summer resorts and places where people congregate temporarily and also, possibly, as a strike weapon. The unfairness of its use in the latter way is so apparent to electric railway men as to require no discussion here.

While the law in this State confers jurisdiction on the public service commission to regulate or forbid the operation of jitneys, as clearly decided in the Scranton cases, it seems to be unfair to expect the commission, with only seven members and with a limited appropriation, to give its time and attention to the details of the terms and conditions under which it will permit the operation of automobiles as common carriers. A statute similar to that passed in Wisconsin could be adopted in Pennsylvania with benefit to all parties concerned, and the commission would be called upon then only to determine whether there was necessity for the additional service in the community proposed by the jitney owner. The commission could well receive additional power, however, to deal primarily with all violators of the public service company law.

Finally, legislation throughout the United States, whether it has been state or municipal, which provides for the giving of a bond by the jitney operator, limiting drivers to those who have had previous experience, fixing the speed, fixing the number of passengers to be carried, fixing the license fee, fixing the minimum hours in which they will furnish such service, providing for a fixed route and a maximum fare, as well as penalties for the violation of such regulations, has been upheld by the courts in every instance.

The October issue of *Trolley Topics*, published by the Louisville (Ky.) Railway, marked the completion of two years of its existence. This was one of the first electric railway house organs. Samuel Riddle, superintendent of transportation, and G. B. Powell, superintendent of employment of the company, are joint editors, while the men in the employ of the company contribute regularly. Several of the executive officers are usually represented in the leading articles, which discuss policies, etc.; there are occasional reprints from other publications; letters of interest to the company are published, and each department is represented by a column of notes. Part of the cost of publication is met by advertisements of Louisville concerns. On publication day the papers are done up in bundles and distributed to the heads of the various departments of the Louisville Railway, by whom they are supplied to each employee.

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*Mr. McCahill's paper was an extended discussion of the legal status of the jitney. It was in pamphlet form and included an index giving references to state statutes on the subject, to decisions by public service commissions, by federal courts and by state courts and to the text of ordinances in Harrisburg and Philadelphia. The abstract given in this issue is only an outline of the paper.

C. E. R. A. A. Holds Annual Meeting

Accountants in Central District Consider Clearing House for Settling Interline Balances and Also Electric Light and Power Accounting—Power Outlook Makes Association Future Bright

THE Central Electric Railway Accountants' Association held its thirtieth meeting on Friday and Saturday, Dec. 8 and 9, at the Hotel Gibson, Cincinnati, Ohio. Two of the four papers presented were of a private character, but the other two, on electric light and power accounting and on a proposed clearing house for interline settlements on electric railways, will serve to indicate once more to all the constructive work that is done by the association.

SESSION ON FRIDAY

Before proceeding with the regular business at the first session on Friday, announcement was made of an invitation received from A. L. Kasemeier, auditor the Cincinnati Car Company, to visit their plant. It was decided that no adjournment should be made for lunch until the first paper on the afternoon program had been read and discussed and that the remainder of this program should be carried over until the session on Saturday in order that the members might take advantage of Mr. Kasemeier's invitation during daylight.

President F. T. Loftus, auditor Indianapolis & Cincinnati Traction Company, Rushville, Ind., in his opening address stated that the future of the association looked bright because many electric railways were entering the electric light and power field and new questions and problems would be presented, necessitating associated effort to solve. In comparison with the work done in some of the previous years, President Loftus said, the association had seemingly done very little during 1916. It had, however, added several good members to its organization, and its rules and agreements had been revised to meet all requirements presented, some for the future even being anticipated. The committee on electric light and power accounting was formed early in the year. The subject of settlement of accounts by bank draft was pushed forward as much as possible in an attempt to get the matter settled. In February President Loftus presented the matter before the Central Electric Railway Association and secured promise of their support. The recommendation of the passenger and freight committee as to a time limit on corrections was also approved. The Question Box was revived by appointing a new committee, but it now seemed that for various reasons this committee would not have any work, and President Loftus thought that it should be discontinued for the present. During the year the association took up with the Central Electric Railway Association the question of allowing an additional $100 to cover the expense of the secretary in attending the accounting meetings, which expense had not been anticipated at the time the original allowance was made because the former secretaries had always been company members. The additional amount was appropriated by unanimous consent.

The report of the standing committee on passenger and freight accounts was presented by Chairman Walter Shroyer, auditor Union Traction Company of Indiana, Anderson, Ind. It dealt at some length with the subject of settlement of interline account balances by bank draft. The report stated that all execpt three member companies were now using the plan, and these would probably adopt the recommendation at an early date. A complaint from a member company regarding the form of mileage coupons was referred to in this report. This question was discussed, and the committee advised to arrange a conference with the Central Electric Traffic Association to consider the matter further.

P. H. Diehl, district manager Railway Audit & Inspection Company, Chicago, Ill., then presented a paper on "Essentials of Street and Interurban Checking." Mr. Diehl pointed out the various conditions on railway properties in regard to the registration and collection of fares, and he explained the different methods of checking city and interurban railways in order to secure satisfactory results. Owing to the private nature of the subject it was decided to consider the association in executive session during the time consumed and no publication will be made of the paper or the discussion thereon.

The meeting then adjourned in order that the members might go on the Cincinnati Car Company trip. Automobiles took the party by a round-about route through the beautiful parks and residence districts of the city to the plant. The inspection of the shops, storeroom and offices was alone considered well worth the time spent.

THE FINAL SESSION

At the final session on Saturday morning the chairman of the committee on electric light and power accounting stated that no report could be made at this meeting as no questions of any moment had been presented for action, but that he hoped the committee would be continued, as its necessity would be apparent soon. A. E. Dedrick, auditor Youngstown & Sharon Street Railway, Youngstown, Ohio, then read a paper on "Electric Light and Power Accounting," presenting the subject in a very simple, easily understood and interesting manner. The opportunity for electric railways to sell their surplus current in the light and power field was dwelt upon, and the necessity of the accountants informing themselves upon the various phases of the whole question was particularly called to the attention of the association.

A. C. Van Driesen, chief accountant Toledo Railways & Light Company, Toledo, Ohio, next read a paper on "Recent National Legislation Affecting Electric Railway Accounting," strengthening his paper by references to rulings of the United States Treasury Department on the income tax laws as revised this year and by the quoted opinions of noted lawyers. The discussion of the subject and of the report-forms of the Interstate Commerce Commission was educational. On account of the intimate issues concerned it was decided that the paper and the discussion thereon should not be published in any manner.

The last paper was by E. L. Kasemeier, auditor Ohio Electric Railway, Springfield, Ohio, on "A Clearing House for Interline Settlements on Electric Railways." This appears elsewhere in abstract form. After considerable discussion the matter was referred to the standing committee on passenger and freight accounts for further investigation and action.

The report of the nominating committee was accepted unanimously, the new officers being as follows:—President—Oren A. Small, auditor Benton Harbor & St. Joe Railway & Light Company, Benton Harbor, Mich.; first vice-president—A. C. Van Driesen, chief accountant Toledo Railway & Light Company, Toledo, Ohio; second vice-president—A. E. Dedrick, auditor Youngstown & Sharon Street Railway, Youngstown, Ohio, and secretary and treasurer—A. L. Neereamer, secretary-treasurer Central Electric Railway Association, Indianapolis, Ind.

The new executive committee consists of the officers and the following members: B. H. Jacobs, assistant auditor Cleveland (Ohio) Railway; J. N. Tabb, treasurer Kanawha Traction & Electric Company, Parkersburg, W. Va.; E. O. Reed, auditor Western Ohio Railway, Lima, Ohio, and Ira E. Guthrie, secretary-treasurer Interstate Public Service Company, Indianapolis, Ind.

The meeting of the association was adjourned at this point. The executive committee met immediately afterward and decided that Fort Wayne, Ind., would be the place for the summer meeting, the date to be decided later.

Clearing House for Interline Traffic Accounts

Plan Is Suggested for Eliminating 90 Per Cent of Drafts Used for Monthly Settlements and Decreasing Bookkeeping Work

BY E. L. KASEMEIER
Auditor Ohio Electric Railway, Springfield, Ohio

THE plan of settling balances by drafts was before the Central Electric Railway Accountants' Association for two or three years, and was only recently adopted as the best method after being approved by the Central Electric Railway Association. I fully believe that the clearing house plan outlined hereafter would not only save a great deal of labor and unnecessary drafts but would be the means of overcoming the objections of those roads which formerly declined to adopt the draft plan for settling balances. It is not intended that settlement through the clearing house would be arbitrary for all members of the association, but its advantages might be used by such companies as cared to do so.

The function of a clearing house is to offset the debit balances against the credit balances. As a result, drafts for the minimum amounts would go through banks. The risk of loss would thereby be lessened, as very often drafts have to be forwarded through banks that are not financially strong and may fail before they account for the amounts collected by them.

The clearing-house plan would eliminate about 90 per cent of the drafts now being made for monthly settlements, with the consequent bookkeeping work in the treasury and accounting departments. Where formerly each railway paid or drew an average of twenty drafts, each would either pay or draw one draft. Instead of keeping separate ledger accounts with each company, the entire interline traffic accounts might be handled on one page of the ledger, under the heading of "Clearing House." The saving in postage and stationery would alone be sufficient reason for making the change.

The clearing-house plan seems well suited to member companies as it can be very easily handled through the office of the secretary-treasurer of the association at a nominal expense. To summarize the statements from all roads would take only a few hours of clerical work each month, and if twenty companies should go into the plan, the work could be done in four or five hours by one clerk.

To handle this properly, it would be necessary to have some blanks printed on which each member would submit to the clearing house its statement of debits and credits for each railway. These blanks would be printed by the association and furnished to the members free, as each company would use only one or two a month and should be relieved from the expense of having a few blanks printed. The clearing-house manager would enter on a large sheet, from the balance column of each company's statement, in the vertical column headed by the railway its debits against each other company and the total credit in the extreme right hand column. When the statements from each road had been entered, the totals of the vertical columns headed by companies would balance with the totals of the last vertical column. Balances showing the net amount due to or by the clearing house for each railway would be shown at the foot of the sheet.

The statement from each company should be sent to the clearing-house manager not later than the twenty-third of each month. On the twenty-fifth of the month the manager would draw on each road owing the clearing house and authorize the creditor road to draw on him on the twenty-seventh, or send out his check to the latter on that date. Railways sending monthly statements showing that they owed balances to the clearing house, might, if they desired, attach their checks or vouchers for the net balances due the clearing house, thereby avoiding the necessity of drafts being made against them later by the clearing-house manager. By paying in this manner, the railways could get the vouchers in the current month's account and prevent any interline balances from being carried over on their books.

Where differences existed between the balances, *i.e.*, the debits reported by one company against another did not agree with the credits reported by the other company, the manager would settle on the basis of the smaller amount and notify both companies. If adjustment should be necessary on account of the manager's changes, it should be taken up in the next month's statement to the clearing house.

There is a possibility that a draft drawn by the clearing-house manager might not be honored by the railway, such as when a receiver had been appointed. It would then be necessary for the clearing-house manager to secure funds from some source to meet the drafts of other companies on the clearing house, or to charge back to all companies credits taken by them against the receiver's line and make drafts for such amounts, leaving the individual railways to settle their claims with the receiver. It would be less work for both the clearing house and the member companies if the clearing house were in a financial position to carry these amounts until authorized by the receiver. At any rate, there would not be so much danger from loss to members on an occasion like this, where only the net balance from all companies would be at issue, as when each individual company made a separate settlement and some companies had probably paid the railway in receivership the balances due to it.

Formal dedication of the new $250,000 Ceramic Engineering Building of the University of Illinois occurred at Urbana on Dec. 6 and 7. Many prominent speakers including Gov. Edward F. Dunne, W. L. Abbott, president of the board of trustees, Dr. S. W. Stratton, director of the United States Bureau of Standards, and Claude Bragdon, author and architect, addressed the several meetings. The Ceramic Engineering Building is a three-story structure covering a ground area of 67 ft. x 189 ft.

Coal Situation in Central States Remains Tense

Various Causes Contributing to Shortage Show Little Improvement—Hardship Created on Electric Railways—Price Likely to Continue High

IN spite of numerous instances of investigations and indications of apparent relief, the situation in the coal market remains acute or even tightens. The cause is manifold, although probably the most direct cause is the shortage of coal cars. The summary of car shortages for Sept. 30 showed a net shortage of 61,031 cars, of which 19,872, or nearly one-third, were coal cars. This seemed an exceedingly bad condition, but was eclipsed by the report for Nov. 1, which showed a net shortage of 108,000 cars—the greatest on record. Inadequate terminal facilities, insufficient motive equipment and the failure to secure prompt unloading of cars have together produced a congestion on many railroads which has effectually prevented anything like the normal movement of freight. This terminal congestion is further emphasized by the action of the Pennsylvania Railroad on Dec. 7, notifying the Western railroads that after midnight of that date no freight of any kind would be received for movement east of Pittsburgh. This indicates the worst terminal congestion America has ever seen, as a similar order has never before been issued. This accumulation of cars in the Eastern terminal, of course, seriously affects the supply of cars in the Middle West, and is partly responsible for the fact that some Illinois and Iowa mines are able to work only three and four days a week. In addition to this, the situation has been aggravated by the fact that the supply of coal cars has been absorbed to a considerable degree in other classes of railroad shipment, particularly in the movement of sand and gravel and of munitions and other war supplies. Instances are even heard of where Illinois and Iowa coal has been purchased in the East, not for the coal, but as a means to get the gondola cars for industrial shipments in the face of inability to secure box cars. The car supply at the mines during the summer months was estimated at not more than 80 per cent of normal, and this has now dropped to only 30 per cent in some cases.

Another common explanation of coal shortage is that industrial activities over the past year and a half, despite a very much enlarged coal output, have left surplus coal stocks in a depleted state. Eastern coal no longer moves to Western markets but is shipped farther East to industrial plants. Illinois coal is being shipped to Ohio and as far east as Buffalo. Because of the great profitableness of moving ore, lake boats which in former years carried eastern coal to the head of the lakes have been making the return trip empty to save time during the past season. As a result Illinois coal is also being shipped to St. Paul, where the supply has formerly been almost entirely from the East through Duluth and Superior.

Then there is the intimation that coal brokers have contributed to the rise in price of coal by certain manipulations, and the fact that the market shows a slight easement as the federal investigation gets under way indicates that there may be some basis for this accusation. With the closing of lake transportation, those who are buying coal on speculation may generally drift into other enterprises and possibly help to alleviate the present high prices. Another suggestion is that the high price of coal in Iowa is due not so much to the increased demand as to the increased production costs.

This combination of causes has meant a serious situation for the large coal users of the Central West. Those who have been buying coal in the open market have been forced to pay prices in some instances ten to fourteen times normal prices. Ordinarily through the months of August, September, October and the greater part of November screenings have dragged on the market, and coal which is now selling for $3.50 to $4.50 a ton has been bought for 30 cents to 40 cents a ton. This year, however, there have been no cheap screenings, and those depending on the open market for good buys find themselves in the high market time with no storage of coal from off-season purchasers on hand. Those who have purchased under long-term contracts have been more fortunate, but have not escaped the general tight condition of the market. While their purchase price has remained comparatively low, they have in most instances been able to get only a portion of the delivery called for in the contract and have consequently had to resort to the open market for the remainder of their requirements and pay enormous prices. The amounts of storage coal carried by the various electric railways have been as a general condition reduced to quantities of little consequence. Buying has been forced to comparatively small amounts. Limitations as to kind and quality of coal have had to be very generally removed, and companies making a practice of purchasing coal on B.t.u. basis have been glad to get coal of almost any heat value. The great demand has also caused a practical cessation of careful sorting of coal at the mines, and the companies receiving coal under long-term contracts have been forced to accept rather inferior grades.

The indications from various parts of the country give little encouragement from which to anticipate any reduction in prices. In the South during the past ten days the prices have increased. In the Northwest the shortage of coal is so pronounced that the docks, facing an early exhaustion, are beginning to distribute their coal only to the places where the needs are most urgent. The car supply in the anthracite fields, in western Pennsylvania, in Ohio, in Indiana and in Illinois is shorter than it was three weeks ago, when the market was at the climax of its rise, according to the *Black Diamond*. The Burlington Railroad last week fell short of its normal performance and compelled a group of its mines to close down for two days in mid-week. This is said to be an unprecedented situation on that line, which is classed now as perhaps the largest coal carrier in America.

The various commissions have advertised their efforts to relieve the situation so loudly that the people themselves have come to believe that cars are easier, and therein lies a danger. The fact is that the users, expecting relief, have to a degree stopped buying because the rush of orders was temporarily moderated. The buying movement week before last slowed down perceptibly, and in response thereto in some districts the price of coal went off as much as 50 cents a ton. However, this reduction in price was only in a few grades of coal but gave a softer tone to all the rest of the markets. This was only in the Chicago district, and when the situation is viewed as a whole the indications are that the market is not easing up as the prices in the central district would seem to indicate.

Jitney operators within the city of Houston, Tex., are required to have their routes permanently painted upon the windshields in letters 3 in. high, according to an amendment to the jitney ordinance which became effective recently. Objections were made to the passage of the amendment, but without effect.

ASSOCIATION NEWS

Secretary Burritt Announces Program for Mid-Year Conference—Engineering Association Committee Appointments—Reports of Meetings of the Equipment Committee, T. & T. Executive Committee and Engineering Association Standards Committee—Company Section Activities

Mid-Year Conference Program

Secretary Burritt has announced the following program for the meeting which is to be held in Boston on Feb. 16, 1917, with sessions morning and afternoon.

(a) Reports of committees.
(b) Report of committee on social relations. Dealing with
  (1) The minimum wage.
  (2) Old-age pensions.
  (3) Employees' thrift.
(c) Prepared discussion of report.
(d) Paper: "Wage Arbitration and Contracts."
(e) Paper: "Salesmanship in the Electric Railway Business."

Committee Appointments

ENGINEERING ASSOCIATION

President F. L. Phillips has announced the following appointments to committees:

Equipment—W. G. Gove, Brooklyn, N. Y., chairman; L. M. Clark, Indianapolis, Ind., vice-chairman; Wm. E. Johnson, Brooklyn, N. Y.; H. A. Johnson, Chicago, Ill.; R. H. Dalgleish, Washington, D. C.; E. W. Holst, Boston, Mass.; J. J. Sinclair, Brooklyn, N. Y.; Daniel Durie, Connellsville, Pa.; J. R. Ayers, Utica, N. Y.

Heavy Electric Traction—Hugh Hazelton, New York City, chairman; E. B. Katté, New York City; W. S. Murray, New Haven, Conn.; C. H. Quinn, Roanoke, Va.; L. S. Wells, New York City.

Power Distribution—C. L. Cadle, Rochester, N. Y.; R. H. Rice, Chicago, Ill.; E. J. Blair, Chicago, Ill.; C. F. Woods, Boston, Mass.; C. R. Harte, New Haven, Conn.; E. S. Gillette, Aurora, Ill.; C. E. Fritts, Kansas City, Mo.; J. H. Libbey, Boston, Mass.; A. Schlesinger, Indianapolis, Ind.

Power Generation—J. W. Welsh, Pittsburgh, Pa., chairman; A. B. Stitzer, New York City, vice-chairman; F. S. Freeman, Boston, Mass.; E. H. Scofield, Minneapolis, Minn.; G. H. Kelsay, Anderson, Ind.; R. W. Eaton, Norwich, Conn.; C. W. DeForest, Cincinnati, Ohio; W. C. Slade, Providence, R. I.; E. F. Gould, Cleveland, Ohio.

Committee to Consider Safety Code of U. S. Bureau of Standards—C. L. Cadle, Rochester, N. Y., chairman (also chairman of Committee on Power Distribution); J. W. Welsh, Pittsburgh, Pa., vice-chairman (also chairman of Committee on Power Generation); C. S. Kimball, Washington, D. C. (also chairman of Committee on Buildings and Structures); W. G. Gove, Brooklyn, N. Y. (also chairman of Committee on Equipment); Hugh Hazelton, New York City.

JOINT COMMITTEE

Block Signals—J. M. Waldron, New York City, chairman; J. W. Brown, Newark, N. J., vice-chairman.

Engineering Association Members—John Leisenring, Springfield, Ill.; J. B. Stewart, Jr., Youngstown, Ohio; R. C. Johnson, Brooklyn, N. Y.

Transportation and Traffic Association Members—J. J. Doyle, Baltimore, Md.; G. K. Jefferies, Indianapolis, Ind.; J. J. Brennan, Fort Wayne, Ind.

Co-operation with Manufacturers Urged at Equipment Committee Meeting

At a meeting of the committee on equipment held in New York, Dec. 13, 1916, W. G. Gove, chairman, made a strong plea for co-operation between the committee on equipment and the manufacturers of equipment, of whom a number had been invited to have representatives at the meeting. Mr. Gove spoke first on the necessity for modernizing the Engineering Manual, emphasizing the need for consideration of various features on the part of the manufacturers' representatives, who were experts in the various branches of engineering therein treated. He thought the present time was opportune to change the entire tone of the Engineering Association, whose specifications for material would be of little value without the advice of the manufacturers, and he advocated taking full advantage of the opportunity afforded by their admission as members of the American Electric Railway Association. In fact, he would not care to see any action taken without the approval of the manufacturers' representatives, and for this reason wanted to have them attend sub-committee meetings and to have their opinions given such consideration as would permit unanimous action. If this was impossible, every opportunity should be provided for dissenting voices to be heard.

With regard to the detailed work of revision for the Manual, Mr. Gove advocated taking up no new work so that the necessary revisions and improvements in the association's standards could be cleaned up at the earliest possible date, although this would probably take two years' time. This, he said, was in itself an especially heavy piece of work and would no doubt demand great personal sacrifices on the part of those who would have to carry it out. Nevertheless the importance to the association was so vital that the committee's activities should not be circumscribed for any cause.

During the remainder of the committee's session, at which there were present L. M. Clark, Indianapolis, Ind., vice-chairman; J. J. Sinclair, Brooklyn, N. Y.; W. E. Johnson, Brooklyn, N. Y.; H. A. Johnson, Chicago, Ill.; Daniel Durie, Connellsville, Pa.; R. H. Dalgleish, Washington, D. C., and representatives of a number of manufacturers, detailed consideration was given to the various recommendations of previous committees on equipment. It was decided that a number of the more important suggested revisions be referred to sub-committees, which were to be appointed later.

T. & T. Association Executive Committee

A fully attended and enthusiastic meeting of this committee was held in New York on Dec. 11. There were present: L. C. Bradley, Houston, Texas, president; W. H. Collins, Gloversville, N. Y.; R. P. Stevens, Youngstown, Ohio; L. H. Palmer, Pottsville, Pa.; J. J. Dempsey, Brooklyn, N. Y.; R. B. Stearns, Milwaukee, Wis.; H. C. Donecker, Newark, N. J.; H. B. Potter, Boston, Mass., and E. B. Burritt, New York City.

The most important action taken at the meeting was the approval of a plan of organization whereby the supervision of committee work will be undertaken in groups, each of which will be presided over by a member of the executive committee. Details of this plan will be given in a later issue of the ELECTRIC RAILWAY JOURNAL.

Engineering Association Standards Committee

As this issue of the paper goes to press the above committee is in session in New York with the following in attendance: H. H. Adams, Chicago, Ill., chairman; C. L. Cadle, Rochester, N. Y.; C. H. Clark, Cleveland, Ohio; E. R. Hill, New York City; J. M. Larned, Pittsburgh, Pa.; John Lindall, Boston, Mass.; G. W. Palmer, Jr., Boston, Mass.; F. R. Phillips, Pittsburgh, Pa.; Martin Schreiber, Newark, N. J.; J. J. Sinclair, Brooklyn, N. Y. The association was represented by E. B. Burritt and C. W. Stocks.

After general consideration of the field before it, the committee appointed a sub-committee to prepare a new plan of procedure in the adoption of standards for presentation to the executive committee. This report was presented on Thursday and was scheduled for consideration on Friday afternoon. On Thursday the following statement of policy was adopted:

> Recognizing that the standards of the American Electric Railway Engineering Association should be so framed as to meet the needs of the largest possible number of electric railway companies, and that material assistance in arriving at this end may be obtained from the criticisms and suggestions of the members of the association who may attempt to apply such standards to the conditions on their own property, the Convention of 1913 adopted as Rules 2 and 3 of the "Rules for the Adoption of Standards and Recommendations" the following:
>
> "2. The executive committee shall determine what subjects shall be considered by the association for possible adoption as standard or recommendations. *Suggestions for new, or changes in existing, standards or recommendations may be submitted* in writing at any time to the president or secretary of the Engineering Association.
>
> "3. The secretary shall submit such suggestions to the executive committee at a meeting or by mail. The executive committee may refer the suggestions to a proper committee with instructions to investigate the subject and report to the committee on standards."
>
> At this time, when the question of a review and revision of existing association standards is up for consideration, the committee on standards calls the particular attention of all of the members of the association to these provisions.
>
> The committee appeals for the assistance of every member company. It hopes that in the interests of the industry, and the interest of the member company itself, that each will make an investigation of the existing standards of the association, with the idea of their applicability to their own needs and uses, and that after such study has been made the association may have the benefit of the criticisms and suggestions which arise therefrom.
>
> The desirability of erecting standards which can be generally adopted must be apparent to all executives and operators of electric railway properties. They are in the interest of economy and efficiency, and such assistance as your company may render in the perfection of those already created cannot but redound to the interest of every one concerned.

R. W. Perkins Addresses Connecticut Company Section

As was mentioned on this page in the issue for Dec. 2, one of the speakers at the November meeting of Company Section No. 7 was R. W. Perkins, president Shore Line Electric Railway. At the time the manuscript of Mr. Perkins' address was not available. Its topic was "County Bureaus to Encourage Agricultural Developments as They Relate to the Street Railway Industry." The purpose of the address was to interest the electric railway men in the opportunities and problems of the farmer to the end that they might co-operate in promoting the more intensive and extensive agricultural developments of their communities. Mr. Perkins showed by many statistics that the United States is far behind many other countries in agricultural production. He explained the plan of the "County League" which is organized to encourage agriculture said that the Shore Line had contributed to the formation and support of this league in four counties in the belief that the creation of any form of business activity along this company's line will add to its revenues and that on lines where the passenger business permits of operating only hourly service, some means must be provided for increased use of the investment. Intensive farming means the employment of more people and an increase in railway receipts. Mr. Perkins explained that the headquarters of the league are in the Chamber of Commerce Building, New Haven, and that the dues are $1 per year.

Nov. 6 Was Medal Day for Meralco Section

The feature of the meeting of the Manila Electric Railroad & Light Company Section held on Nov. 6 was a talk from Vice-President Duffy regarding his approaching visit to the United States and the presentation by Mr. Duffy to B. H. Blaisdell of the Doherty gold medal which had been awarded by the National Electric Light Association for the best paper presented before a company section. Ten new members were received, of whom nine were from the transportation department.

Mr. Duffy's talk was of a personal nature, beginning with the statement that he was leaving Manila for three months partly for business purposes and partly to spend Christmas with his family. He expected to attend the mid-winter meeting of the association. He took the occasion to review the two years' history of the section and congratulated it upon the facts that twice had medals been received for papers presented and that the membership is 118, which, considering the total number of employees (1600) and the cosmopolitan character of the membership, is very creditable.

In presenting the Doherty medal, Mr. Duffy exhibited the medal and described it in detail and also carried out his promise to present personally the sum of 100 pesos to the winner. Not to be outdone by Mr. Duffy in generosity, Mr. Blaisdell in turn promised to present a similar amount to the next member of the company section who received a medal from either the American Association or the N. E. L. A. The entertainment features of this meeting were rather unusual, one being a volley ball game between the Filipino team from the transportation department and the Filipino team from the electric department. There were also pillow contests, silver mining, apple float, four-arm wrestling and music from the transportation department orchestra.

Recent Hampton, Va., Meetings

At a joint meeting of the railway, gas and electric company sections of the Newport News & Hampton Railway Gas & Electric Company held on Dec. 5 the speakers were Martin Schreiber, engineer maintenance of way Public Service Railway, Newark, N. J., and William O. Stieff, Galena Signal Oil Company, Reading, Pa. Mr. Schreiber outlined the advantages of the company section to a company and its employees and, with the aid of lantern slides, described the new terminal in Newark. Mr. Stieff spoke on the necessity for co-operation in the maintenance of equipment which he illustrated by means of charts. He also gave technical information on the distillation of oils, illustrating this with charts and oil samples.

At the meeting of the railway section held on Nov. 3, Wilkie F. Collins, assistant engineer, lectured on units.

COMMUNICATIONS

Timber Preservation by Pressure and Open Tank Processes

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
FOREST PRODUCTS LABORATORY
MADISON, WIS., Dec. 9, 1916.

To the Editors:

The recent installation of a first-class pressure timber preserving plant by the Boston Elevated Railway, as described by E. W. Bright in the Nov. 18 issue of the ELECTRIC RAILWAY JOURNAL, is an important event in the wood preserving industry, as it shows the trend of the electric railways toward the use of treated timber. In the last year for which statistics were available (1911) only 15 per cent of the ties purchased by electric railway companies were treated, as compared with 24 per cent for the steam roads.

The Boston Elevated Railway is in a fortunate position in that it can use a comparatively large amount of treated timber, and is thus able to construct a wood preserving plant. This is beyond the resources of many electric railways. There are, however, numerous commercial plants which are in a position to furnish treated ties, and where it is impracticable for a company to own its own plant it should seriously consider the next best alternative of purchasing ties from a commercial plant. This is, as a rule, preferable to operating an open-tank plant. Where treated ties are purchased, however, a good specification covering the treatment should be used, and here the recent specification adopted by the American Electric Railway Engineering Association should prove to be of valuable assistance. It is also very important to have adequate inspection at the treating plant, and if it is impossible for the purchaser to hire his own inspector good service may be obtained from commercial inspection bureaus.

Ties should be thoroughly seasoned before they are treated and the order for treated ties should be placed from nine months to a year before they are needed, to enable the plant properly to season the material. In some cases it is, of course, possible to purchase thoroughly seasoned ties, but it will be very frequently found that commercial treating plants have no seasoned ties in stock, and then it is necessary either to treat green ones and obtain questionable results or to hold up the order until the ties can be properly seasoned.

In some cases it is not practicable for a company to invest the amount of money required for a suitable pressure plant or to purchase its treated ties from a commercial plant. In this case the only alternative is to install an open-tank plant. The penetrations and absorptions usually obtainable with an open-tank plant are inferior to those obtainable in a pressure plant and, hence, equally good results should not be expected. If a uniform penetration of an inch or more of creosote is obtained the ties may be expected to resist decay for fifteen or twenty years, provided mechanical wear is not sufficient to cause their removal sooner. If a penetration of ¼ to 1 in. is secured it is probable that the average life of moderately durable species under light traffic would be from ten to twelve years. A penetration of less than ¼ in. would, under light traffic, probably add from two to five years more than the average life that could be expected from the ties if used without treatment. The penetration which can be obtained by the open-tank process with different species will vary with the amount of sapwood present and the condition of the wood. In general, however, if well seasoned, such easily treated species as lodgepole pine, western yellow pine, and loblolly pine can be given a thorough treatment by the open-tank process, while Douglas fir, hemlock, tamarack, and spruce can be given a thin treatment with creosote. Hence, while the open-tank process has its limitations, its use should be considered by those companies not in a position to install their own treating plants or to purchase treated material under contract. CLYDE H. TEESDALE,

In Charge, Section of Wood Preservation.

The Toledo Meeting of the C. E. R. A.

INDIANAPOLIS & CINCINNATI TRACTION CO.
INDIANAPOLIS, IND., Dec. 11, 1916.

To the Editors:

I read somewhat with surprise the first editorial in your number of Dec. 2, 1916. Your paper is usually so accurate and has always taken so much interest in and given so much support to the Central Electric Railway Association that I think the editorial referred to deserves some notice.

The meeting of the association held at Toledo on Nov. 23-24, 1916, was indeed a very notable meeting, especially in the character of the program, which was replete with excellent papers from start to finish and discussions of the various papers. The interest taken in the meeting throughout was much more than usual, although the association meetings always receive great attention.

The suggestion in your editorial that "real progress was made by the managers" is certainly correct, but it was not a managers' meeting only. As is always the case, a good many attending did not register, but the registration of attendance of railway men shows that there were 6 master mechanics, 3 power superintendents, 3 track superintendents, 11 general managers, 8 superintendents, 2 purchasing agents, 2 presidents and 27 miscellaneous. The registration of supply men shows that there were 7 engineers, 24 salesmen, 4 special men and 5 miscellaneous. From this you will see that the attendance was quite well distributed in the various lines and, in fact, the papers and the discussion of them disclosed this. It is seldom that as good discussion of papers is secured at any association meeting.

CHARLES L. HENRY, President.

[We are glad to give space to Mr. Henry's letter, as the editorial in question was upon a subject which we should be glad to see further discussed—namely, the best kind of an organization for a sectional association. There was no intention in the editorial of reflecting upon the character of the Toledo meeting. In fact, the excellence of the engineering papers presented there, as well as at previous meetings of the C. E. R. A., suggested the desirability of a larger attendance of engineers and the best means for securing it. There are so many active sectional associations to which the question of programs and best organization applies that the subject is an important one. Incidentally, the official registration at Toledo shows that the actual number of master mechanics and electrical engineers at the meeting did not differ materially from the off-hand estimate given in the editorial.—EDS.]

Some Recent Advances in

EQUIPMENT AND ITS MAINTENANCE

Inspecting and Recording Car Troubles Save Money on Interurban System—Different Stokers Show Highest Economy Under Different Loads—Inexpensive Cone for Pouring Pitch Joints in Pavements Proves Satisfactory in Brooklyn—Fare Recorder Shows Passenger Miles and Money Collected—Regulator Gives Constant Current for Car Lights

(*Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.*)

Device for Pouring Pitch Joints in Pavements

The Sheet Iron Cone Described Costs About $4 and Greatly Facilitates a Troublesome Job

BY R. C. CRAM
Assistant Engineer Way and Structure Department Brooklyn Rapid Transit System

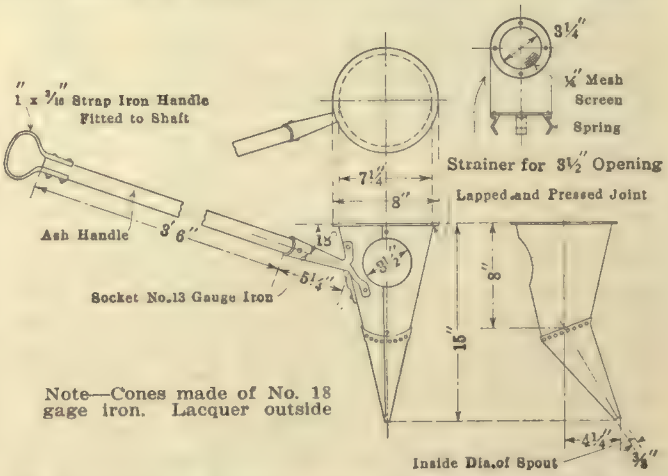
There has always been more or less difficulty in pouring pitch in pavements requiring pitch and pebble joints, due to the quite general use of some form of pail or can having a nose or spout. Such cans are rather unwieldy and in using them it is not easy to control the flow of pitch either as to direction or as to amount. Thus much material is wasted by being spread over the heads of the paving blocks instead of passing into the joints.

The device shown in detail in the accompanying sketches is called a "pitch-pouring cone" and it has been developed for the purpose of obviating some of the difficulties incidental to the use of pitch joints. The design was originated, according to the writer's understanding, by N. H. Johnson, who is connected with the Hastings Pavement Company, of New York City. It is now in quite general use for pouring pitch and pebble joints in granite pavement and has also been used for the same purpose in connection with pitch joints in wood blocks and asphalt block pavements.

The photograph reproduced herewith shows the tool in use pouring joints in a lug wood block pavement, where it was also used for pouring sand in the joints to a depth of about ½ in. prior to the pouring of the pitch, the sand being used to prevent the pitch from running under the blocks.

PITCH-POURING CONE IN OPERATION

This cone can be used to advantage in windy weather by setting up a three-leaf box screen similar to that used to screen the flame of an arc welder, on the windward side of the work. These tools cost about $4 each in half-dozen lots, and are made for this company by a local sheet-iron worker.



DETAILS OF PITCH-POURING CONE IN USE ON BROOKLYN RAPID TRANSIT SYSTEM

Modern Practice in Mechanical Boiler Stoking

The Author Sums Up the Situation and Mentions the Merits and Limitations of the Several Types of Mechanical Stoker

BY JOHN VAN BRUNT
Chief Engineer Combustion Engineering Corporation, New York, N. Y.

The study and application of scientific means for firing and burning coal is comparatively a new science. In the last few years it has undergone radical changes. Many improvements have been made in the leading types of automatic stoker on the market, and some four or five distinctly new stokers have been developed.

We may divide the various machines offered for the consideration of boiler plant owners into two general classes, overfeed and underfeed. Of the overfeed varieties we may further make a subdivision into four classes as follows:

1. The straight overfeed stoker, providing means for mechanically feeding the coal downward on an inclined grate by gravity to a dump grate set at the bridge wall in the rear of the furnace.
2. The side-feed types which, by means of placing the stoker out in front of the boiler usually in a "Dutch oven," provide charging boxes on each side of the grate which supply coal through movable gates to inclined grates. These have their lowest point in the center of the furnace, where a clinker grinder revolving slowly continuously discharges the refuse.
3. That type which provides for charging the coal

from the front end of the furnace on an inclined grate built up in a series of steps or shelves, alternate grate bars having forward and backward motion which may be adjusted over a reasonable range. This provides means for agitating the fuel bed and working the burning coke toward the rear of the furnace, where the resultant refuse is deposited on the ordinary dump plates used in this type of stoker. In this type means are provided for cooling the grates by the circulation of water through pipes cast in them and connected with the water drum of the boiler. The water flowing into the bars is automatically checked when they are filled and discharge is made into the steam drum of the boiler. This stoker sometimes employs forced draft.

4. The chain or traveling grate, consisting of an endless series of links actuated in their travel by gears and sprockets which keep the fuel constantly moving toward the rear of the furnace and there discharge the ash.

The operation of these several types of stoker is excellent in many plants. They are logically the next step in advance of hand firing. They provide a means of introducing fuel into the furnace and consuming it without opening and closing the furnace doors, thereby increasing the economy and efficiency of the furnace, and one type further provides a means of cooling the grates. In many cases they leave nothing to be desired, especially where the load is steady and sudden demands for very high overloads are not made.

If we could point out any weakness it would be that practically all of these types depend upon natural draft, and are therefore limited as to capacity and not capable of the high degree of flexibility which we find in the forced draft apparatus; also that when forced they produce an objectionable quantity of smoke.

The principle of the underfeed stoker is radically different from any of the above. In all coal there is a larger or smaller proportion of gas. When green coal is charged into the furnace, the first thing that takes place is the liberation of this gas. Unless means are provided for igniting the gas, it passes on through the boiler and up the stack, as is the case in hand firing and to some extent in overfeeding. Inasmuch as some of the coals burned in ordinary practice have a gas content of about 32 per cent, it will be readily seen that the loss of this valuable combustible is a considerable waste.

In the overfeed types of stoker the means adopted for igniting and utilizing this gas embrace the construction of a firebrick arch over the fire, which becomes incandescent. The function of this arch is to ignite the gas as it travels upward when the furnace is charged. Although the overfeed stoker is cheaper in first cost than any of the underfeed stokers on the market, there is a question in the mind of the writer as to whether the up-keep cost of rebuilding these arches does not in the long run offset to a considerable degree any saving that may be made in the first cost of installation. The theory of underfeeding is based on the primary combustion of the coal in a manner that allows the recovery and utilization of these gases without employing expensive arches. In the first type of commercially practical underfeed stoker the coal was fed into the furnace by means of a screw conveyor. The fuel was then deposited on dead or open grates along the sides of the retort and air was admitted only through tuyere blocks on the retort sides. For boiler practice ten to twenty years ago such a method of firing was adequate. No means, however, for dumping refuse was provided, nor was air admitted under pressure at any point in the furnace except along the sides of the retort. Although in some rare instances side dumps were provided, absence of means for mechanically spreading the fire limited their usefulness.

With the increased use of electric power and the installation of stokers in power plants where the load is very irregular, the limitations of this type of stoker became increasingly obvious. It had very little flexibility and the refuse from the fire had to be hoed out through the furnace door in the same manner as with a hand-fired furnace. Therefore, while it was possible to increase the rating of the boiler materially by multiplying the number of stokers installed under a given sized unit and increasing the speed of the worm, there was no practical means provided for removing the refuse without throwing the boiler out of line.

Efforts were then bent toward developing a stoker which would satisfactorily perform the following functions: (1) Spread the fire mechanically and do away with hand manipulation; (2) provide for the admission of heated air over the entire furnace underneath the fire; and (3) discharge ash without interrupting the operation of the boiler.

These results are accomplished by a stoker introduced about ten years ago. The mechanical spreading of the fire is accomplished by means of alternately moving and fixed bars. Worms and plungers are done away with and the feed is accomplished by providing a sliding bottom with a pusher block at the throat of the hopper. This moving bottom extends the whole length of the retort and reciprocates with the movement of the grate bars. With this type of stoker an absolutely uniform feed from front to back and from side to side is assured in all furnaces. Unlike most of the stokers both overfeed and underfeed there is no considerable pitch to this stoker. It is level from front to back with a slight slope from the retort toward the side walls, but the fire bed is practically level. It depends in no degree upon gravity for any part of its operation, all of its function being mechanical. A feature of advantage in this stoker is adaptability to very wide furnaces without adding to the number of retorts.

The grate bars are hollow and air is forced from the wind-box opening at the end of the bar, along through the bar toward the side walls. It is then discharged underneath the grates into an auxiliary heated-air chamber, then passed upward through narrow openings between the grate bars, thus providing an intensely active grate area throughout the furnace and also cooling the bars.

Dump trays along the side walls collect the refuse as it is pushed down by the moving grate bars, which are the only parts of the stoker that are not under forced draft. This refuse is allowed to accumulate and burn out until the operator of the machine sees fit to clean fires. These dump trays are operated by the simple movement of a lever outside the furnace, which drops the plate and discharges the refuse into the ash pit or the hopper below. Cleaning periods vary with the conditions at various plants, depending somewhat upon the grade of coal used as well as the load.

Another type of underfeed stoker is known as the multiple-retort type, of which there are several on the market. The multiple-retort stokers take us back to the general principle involved in overfeeding; that is, the law of gravity is utilized to a greater or less degree in spreading the fuel. They differ from the overfeed type in the respect that the green coal is forced up underneath the front end of the fuel bed, instead of being introduced on a coking plate. This stoker also embraces the advantage, as do all underfeed stokers, of dispensing with the firebrick arch. After the coal has been forced underneath the fire at the front end gravity is depended upon almost entirely to accomplish the spreading of the fire.

At the back end of the furnace at the bottom of the inclined grates are dump plates. These are usually operated by hand-thrown levers at the front of the stoker, but in some cases where heavy duty is demanded they are mechanically operated. All of the refuse is concentrated at the extreme back of the furnace, and it is natural that the trend should be in the direction of a mechanical means for discharging refuse.

A feature claimed for this stoker is that it may be adapted to very wide boilers by simply adding retorts or units. Between retorts there is a space about equal to the width of a retort, which is filled with tuyere blocks, and these are slotted at the sides to admit forced draft. The air is not heated, but considerable overloads may be carried upon this stoker.

This description will in the main cover the other types of multiple retort stokers, noting such slight exceptions as a difference in the form and operation of the plungers and auxiliary plungers, and the fact that in some types corrugated tuyeres are used and in others the sides of the retorts have a movement forward and backward, which adds to the rapidity and positiveness of distributing the coked fuel. There are, of course, other stokers that embrace modifications of these ideas and combinations of the principles embraced in overfeeding and underfeeding, but the main lines of design are clearly exemplified above.

In considering the relative merits of various types of stoker, we should remember that the overfeed stoker is limited in its capacity as to overloads. Moreover, even with the forced draft stokers the general character of the fuel to be used and the overloads required should be carefully considered. A coal that is high in ash, having a soft clinker which is likely to form in great masses, should be burned upon a stoker which will be easy to clean and which will so deposit the refuse that it may be reached by the operator in the easiest possible manner and broken down and discharged with the least trouble and interruption to the boiler. Ability to handle high overloads is merely a matter of getting coal into the furnace with sufficient air for proper combustion and keeping the fire clean.

To sum the matter up in a few words, we find in the case of the overfeed stoker, low first cost with capacity limited to natural-draft conditions, and with the forced-draft stoker, somewhat greater first cost, but a very considerable increase in capacity and efficiency, and in at least one case practically equal simplicity of design and operation.

Fastening Feeder Pipes to Vertical Columns

BY G. B. TANIS

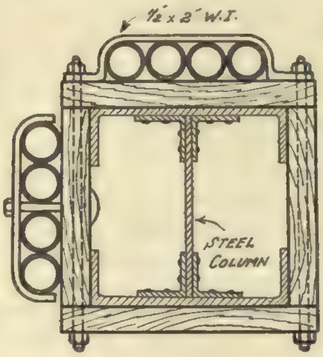
Electrical Department, Brooklyn Rapid Transit System

Among the several possible methods of fastening feeder pipes to poles and other vertical members, the one shown in the accompanying illustration which was used for fastening a number of pipes to the column of an elevated structure is exceptionally neat and durable.

In the scheme illustrated, four 3-in. x 5-in. oak blocks are held in place by means of two ¾-in. bolts, which also hold the ends of ½-in. x 2-in. wrought-iron straps clamping a row of pipes. The pipes on the adjoining side of the column are held in position by straps of the same size which, however, have only one bolt located in the center.

For the purpose of furnishing insulation, preventing the rivets from wearing holes in the pipes under vibration, and providing a ready means for attaching other pipes when desired, it has been found expedient to place wooden blocks between the pipes and the columns.

For 500,000 and 1,000,000-circ. mil feeders the pipes are usually 3 in. in diameter and galvanized. All bolts, nuts and washers are galvanized and the steel traps receive two shop coats of paint and one coat to match the structure when installed.



SCHEME FOR CLAMPING PIPES ON COLUMNS OR POLES

VIEW OF PIPES CLAMPED TO COLUMN OF ELEVATED STRUCTURE

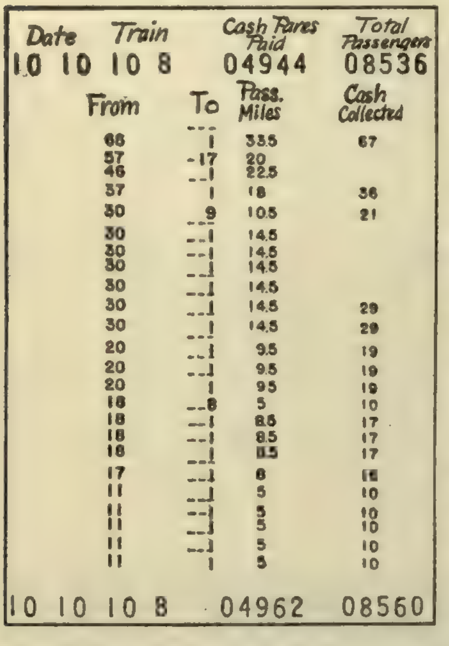
In most cases only one holder is used, this being placed a few feet from the top of the pipes which are about 15 ft. above the ground. The lower ends of the pipes are concreted in the sidewalk or road.

Fare Recorder for Interurban Service Gives Passenger Mileage Direct

Twelve cars on the 45-mile Crawfordsville division of the Terre Haute, Indianapolis & Eastern Traction Company have been equipped with Bonham fare recorders for registering passenger fares and traffic data. These recorders provide a means of obtaining the passenger miles traveled, as well as a record of when and where the travel takes place. The recorders consist of a mechanism which prints on an ordinary adding machine

FARE RECORDER MOUNTED ON CENTER BULKHEAD OF INTERURBAN CAR paper strip the origin and destination of each passenger ride, and at the same time the mileage between these two points and the cash fare collected.

This is done by setting two hands on the dial of the register, one at the starting point and the other at the destination point and making the registration. The dial is marked to record the points on the line by ½-mile stops designated by number. As the conductor collects the fare he sets the two hands from any part of the car by means of rods extending the length of the car, and registers cash fares on one side of the device and ticket fares on the other. The ticket fares are recorded as to beginning and end of the ride and mileage, but with the cash item omitted. This is clearly shown on the accompanying record taken on a limited run between Crawfordsville and Indianapolis. At the top of the strip, when the conductor puts in his key, the date, train number, opening number of cash fares and opening number of total passengers are recorded. These are repeated at the bottom of the strip with the changes in fare numbers when the record is removed at the end of the trip. The titles to the several columns have been printed in to explain their significance for the purposes of this article. The conductors remove these strips from the recorder after each strip. This is an advantage, for they can check up and note any errors made on their part, or if any defects have developed in the recorder they can report at once to the dispatcher and have the car taken out of service.



Date Train Cash Fares Paid Total Passengers
10 10 10 8 04944 08536

From	To	Pass. Miles	Cash Collected
68	1	33.5	67
57	17	20	
46	1	22.5	
37	1	18	36
30	9	10.5	21
30	1	14.5	
30	1	14.5	
30	1	14.5	
30	1	14.5	
30	1	14.5	29
30	1	14.5	29
20	1	9.5	19
20	1	9.5	19
20	1	9.5	19
18	8	5	10
18	1	8.5	17
18	1	8.5	17
18	1	8.5	17
17	1	8	16
11	1	5	10
11	1	5	10
11	1	5	10
11	1	5	10
11	1	5	10

10 10 10 8 04962 08560

SAMPLE RECORD MADE BY FARE RECORDER

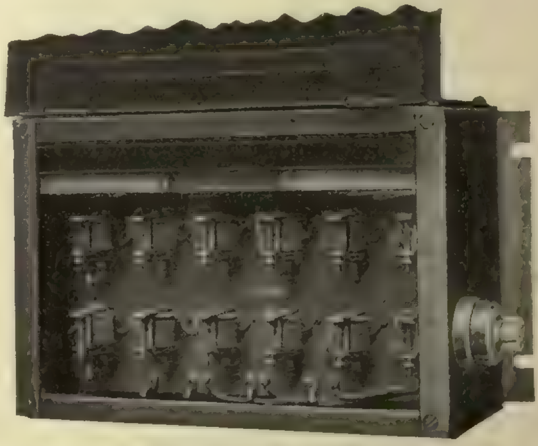
The record on this plain adding machine strip with six registrations to the inch introduces a saving in paper and printing over the common duplex receipt system and gives the total passenger miles directly by simply adding the mileage figures. The conductor himself checks by subtracting the differences between the opening and closing cash fares and total fares, giving a figure which should represent the number of tickets he should have for that trip. The cash figures are totaled on the T. H., I. & E. system by a girl and a comptometer in the auditor's office.

The ease of obtaining the passenger-miles by means of this recorder offers great possibilities for various traffic studies. The mileage may be compiled complete each day or the records kept and footed at any time when a traffic study is to be made. L. T. Hixson, auditor Terre Haute, Indianapolis & Eastern Traction Company, has found it impracticable to compile such a study each day, but instead he keeps the individual conductors' reports, and when a traffic study is desired it is a simple matter to go through the particular runs in question and obtain complete data as to passenger-miles and time and places of heavy and light travel.

Regulating Voltage for Car Lighting

An Automatic Regulator Which Varies Resistance in Series with Car Lamps

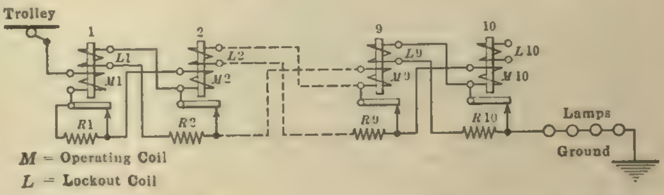
Voltage variation renders lighting unsatisfactory in many cases, particularly on interurban lines. Where through service is given, it is especially important to supply illumination suitable to permit reading. Where the density of traffic over a line is great enough to warrant the investment in sufficient copper, reasonably good lighting can be furnished. Otherwise there remains only the storage battery, which is expensive to install and maintain, or some kind of automatic regulating device.



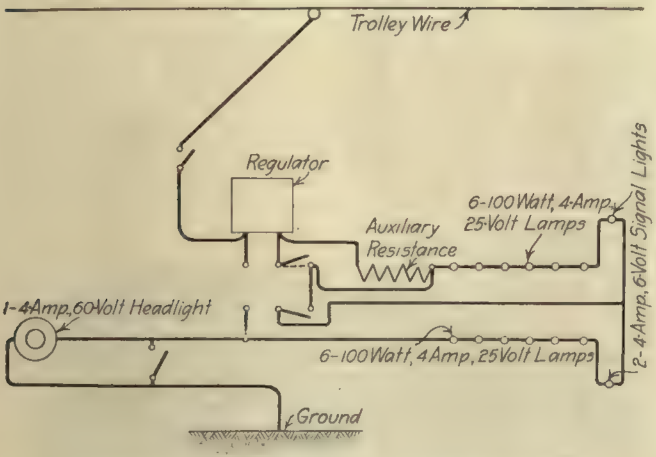
REGULATOR INCLOSED IN STEEL CASE FOR MOUNTING IN MOTORMAN'S CAB

Two years ago the general manager of the Milwaukee Northern Railway, realizing the need of some means of voltage regulation for car-lighting, installed for trial the Watson car regulator on one of its cars operating in limited service between Sheboygan and Milwaukee, Wis. Later, when repairs and inspection made it necessary to take this car off the regular evening run, the complaints about poor lighting were so numerous and insistent that the management had ample evidence of the public's appreciation of the better lighting afforded by the car with the trial equipment, and proceeded gradually to equip all of the cars with the same system. Mention was made of this type of regulator in the annual convention number of the ELECTRIC RAILWAY JOURNAL of Sept. 30, 1916, page 612.

In general this system of regulation comprises a series of electromagnetic relays operating to cut in or cut out resistances in series with the lamps, as the line voltage varies to maintain a practically constant current. As the current ordinarily used with headlights is approximately 4 amp., this was adopted as the value best suited to the regulated system. The regulator consists of twelve relays, only ten of which are used for ordinary operation. Each cuts in or out of the circuit a resistance of 7 ohms. With full line voltage all of the resistors are in the circuit, and there are then 280 volts across the regulator. The Milwaukee Northern Rail-

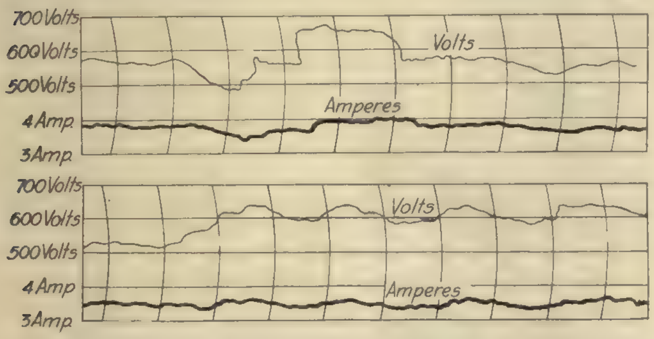


SIMPLIFIED DIAGRAM OF REGULATOR CIRCUIT AND CONNECTIONS way operates with a 650-volt trolley pressure, so that the system includes the standard regulator in series with eleven 4-amp. 19-volt lamps and the 4-amp. 80-volt headlight, together with the four 80-volt marker lights, which are connected in parallel. Two extra 19-volt lamps are installed in the baggage compartment, and as the eleven interior car lights, the headlight, the regulator and the markers require the 650-volt trolley potential, each of the two baggage compartment lamps is cut into the circuit by means of a three-way switch, which, at the same time, cuts out a lamp mounted on the front bulkhead in the smoking compartment. The two lamps in the baggage compartment serve the purpose of affording an extra lamp which can be inserted in place of any of the interior car lamps in addition to giving the motorman light as needed.


Trolley Wire
Regulator
6-100 Watt, 4-Amp. 25-Volt Lamps
Auxiliary Resistance
2-4 Amp, 6 Volt Signal Lights
1-4 Amp, 60 Volt Headlight
6-100 Watt, 4 Amp, 25 Volt Lamps
Ground

GENERAL WIRING DIAGRAM OF LIGHTING SYSTEM INCLUDING REGULATOR

All calculations for normal operation are based on ten relays, the two extra relays being provided to give added safety during voltage surges, or for use if some of the lamps are "shorted" out. With a maximum trolley voltage of 680 across the total lamp resistance of 100 ohms and the 70 ohms total regulator resistance the current is 4 amp. The relays are adjusted for a 10 per cent regulation. When the voltage drops to 612 there are 3.6 amp. flowing, at which time one relay operates, cutting out of the circuit a resistance of 7 ohms and permitting the current to increase to 3.75 amp. Continued drop of the trolley voltage causes each of the successive relays to cut out a resistor and bring the current back to nearly the normal value. For rising voltage the reverse operation takes place.



SAMPLE SECTIONS OF GRAPHICAL VOLTAGE AND CURRENT RECORDS FROM ACTUAL RUN

The average working current is about 5 per cent below the normal rating of 4 amp., insuring long life of the lamps.

The relays are interlocked, being made to operate in proper sequence by an electrical lockout coil on each relay, which strengthens the magnetic pull. The resistor, cut in or out by each relay when it operates, is wired in series with the lockout coil of the relay next to function, and both are short-circuited by the armature of the relay. The relays are all set at the same operating value, but when the current decreases so that, say, No. 10 relay functions and cuts out its resistor, R10, the armature also short-circuits the lockout coil, L9, of the next relay No. 9, leaving this relay with a weaker magnetic pull, and thus ready to operate if the current value decreases further. The consecutive operation of the relays is, therefore, entirely automatic and positive. When the trolley first makes contact, the inrush of current causes all of the relays to "pick up," because all are in series, and being de-energized, all armatures are down, keeping resistors and lockout coils cut out. Then as this action cuts in all of the resistors, and all lockout coils except that on the relay first to operate, No. 10, the current drops, and if the trolley voltage is not a maximum, the relays quickly adjust themselves to the existing voltage.

For dimming the headlights within city limits, a lamp is connected in parallel with the headlight, reducing the current flowing through the latter, since the total current is regulated to 4 amp. If the headlight burns out and no 80-volt lamp is available, the run is completed by inserting one of the spare 19-volt lamps and the two extra relays of the regulator take care of the excess voltage.

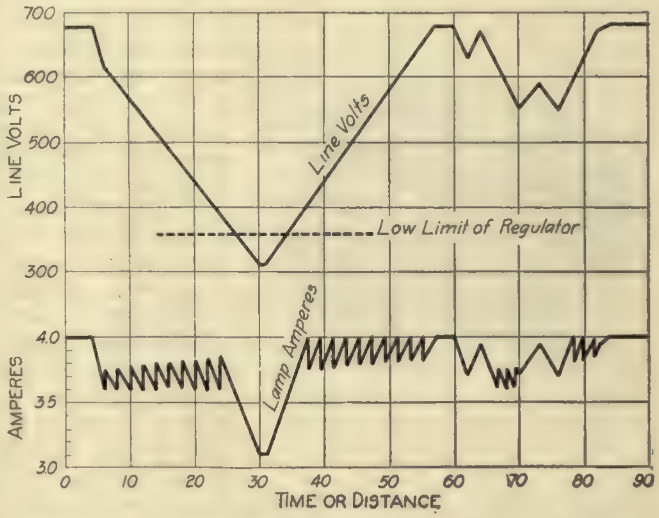


CHART OF CALCULATED VOLTAGE-CURRENT VALUES TO SHOW OPERATION OF REGULATOR

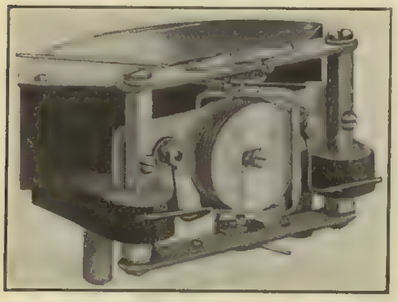
The installation of the regulator system may not require the rewiring of the car lighting circuit. If the series system has been used with a comparatively few large-size lamps, the rewiring consists in running a single wire through the car. Another wire is run from the regulator to the mid-point of the interior lighting circuit, to give precaution against the loss of the headlight and the car being thrown in darkness by the failure of one of the lamps in the series. This is done by the provision of a resistance equivalent to that of half of the car lamps, which the motorman can insert by simply throwing a single-pole, double-throw switch in his compartment. In either one position or the other this switch restores half the lamps of the car, and thus affords some light while the defective lamp is being located and replaced by the spare lamp in the baggage compartment.

The above description gives the particular application of the regulator to the Milwaukee Northern Railway, but the system is flexible and permits the use of many other combinations of lamp sizes and number of lamps the only limitations being the wattage available. From this amount must be deducted the watts dissipated in the regulator and headlight, leaving the wattage available for the interior car lighting. For this the possible combination of lamp sizes and number of lamps for the particular trolley voltage is determined by the simple law governing, *viz.*, that as lamps of higher voltage are selected fewer need be used. If fewer lamps are desired than one sufficient to dissipate the energy available for car lighting, the remainder can be dissipated in heat in a resistor or preferably for overlighting the car.

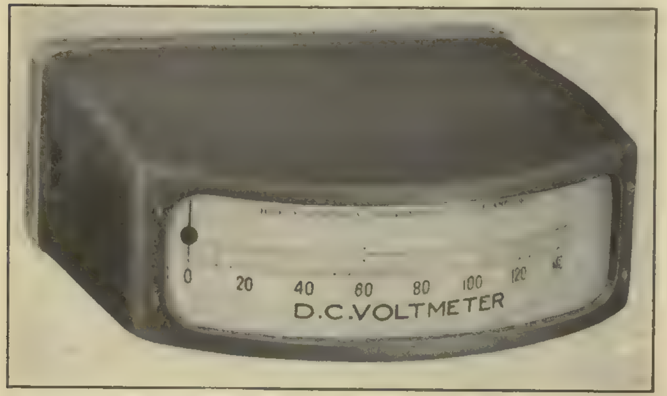
The Watson regulator is manufactured for the Car Lighting Improvement Company of Milwaukee by the Cutler Hammer Manufacturing Company, and Holden & White of Chicago are the general sales agents.

A New Type of Astatic Meter

A complete line of laboratory, portable and switchboard meters is now being made by the Hickok Electrical Instrument Company of Cleveland, Ohio. The laboratory and portable standard instruments are of the astatic dynamometer type, made in ranges up to 750 volts and 100 amp. The astatic feature is obtained by using two complete elements so connected that their polarities are 180 deg. apart. Any field increasing the torque in one element will decrease the torque an equal amount in the other element, and as the elements are in series, the deflection will not be affected. The moving coils are mounted as usual with their springs fastened to a fixed frame. The field coils, however, are manually revolvable by a button at the top of the instrument. A secondary pointer is attached to the field coils and by holding this pointer over the indicating pointer, the field coils are kept at right angles to the moving coils with any reading of the meter. This gives the wattmeters a uniformly spaced scale and the voltmeters and ammeters a scale which advances uniformly with the square of the current.



MOVING ELEMENT OF ALTERNATING-CURRENT SWITCHBOARD METER, SHOWING FIELD AND MOVABLE COILS

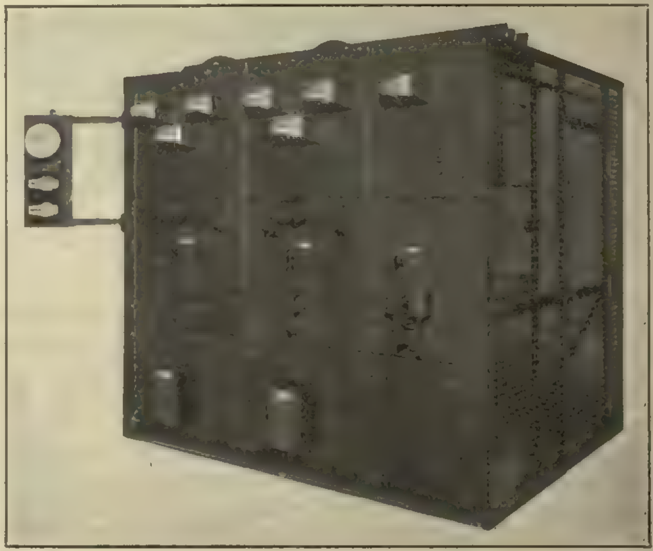


DIRECT-CURRENT SWITCHBOARD METER OF HORIZONTAL EDGEWISE TYPE

Horizontal edgewise patterns and round patterns are designed for switchboard work. The alternating-current type contains a dynamometer movement made up of a fixed field coil and a moving coil as the illustration on this page shows. The direct-current type, which is shown in another illustration, operates upon the d'Arsonval principle, and has a small, light and strong moving coil. A "dead beat" quality in all these models is secured by the use of a light aluminum vane.

Safety First in Switchboard Construction

Manufacturers of electrical apparatus have been among the foremost in propagating and practicing the safety-first idea. The General Electric switchboard shown in the illustration on this page is a product made with this idea in mind. All live parts except meter receptacles are inaccessible from the front of the board. A most important development is the mounting of the field switches on the back of the board. The switch is operated by a handle in front of the board and the operator is protected from injury by the arc or by coming into contact with live parts. For testing instruments the board is provided with calibrating receptacles into which may be inserted plugs connected to the standard instruments. Removable screw plug fuses provide for the replacement of secondary potential transformer fuses from the front of the board.



SWITCHBOARD SHOWING PROTECTED FIELD SWITCHES AND OTHER SAFETY FEATURES

Grillwork screens with locked doors afford protection against accidental contact with live parts in the rear. Disconnecting switches are used between all oil circuit breakers and busbars and provide convenient and rapid means for isolating the breakers when inspecting, changing oil or repairing.

The police authorities of Louisville, Ky., have been asked by the Louisville Railway and the school officials to undertake to control rowdyism on the part of school boys on their way to and from school. One of the favorite pastimes of the boys, especially where they ride on the trailers, is to "rock the boat" by jumping up and and down as if they were operating a see-saw. They have frequently rocked single truck cars off the tracks and otherwise made trouble. Their latest escapade, however, occurred recently when their "rocking" broke the trailer away from the motor car of the "school kids' special" from the Highlands. The motorman noticed at once that something was wrong and shut off the current. As he slowed down the wild trailer caught up with his car and in the collision that resulted at least twelve pupils were injured.

NEWS OF ELECTRIC RAILWAYS

Traffic and Transportation

Financial and Corporate **Personal Mention** **Construction News**

FRANCHISE PROPOSAL MADE IN MINNEAPOLIS

Horace Lowry, President Minneapolis Street Railway, Submits Tentative Ordinance—Surrender of Existing Grant and a Partnership With City Suggested

Horace Lowry, president of the Minneapolis (Minn.) Street Railway, on Dec. 8 submitted to the City Council, in response to its request, a draft of a proposed franchise together with an inventory of the company's properties and an explanatory letter. The draft has been referred to the franchise committee. Mr. Lowry's letter follows in part:

"We submit herewith draft of proposed franchise based on transportation at cost, together with detailed inventory and appraisal of the property of the company as of Jan. 1, 1916.

"The franchise ordinance which we submit should not be considered a complete and final instrument, for the reason that during consideration and discussion by your honorable body many items in the interest of the city as well as of this company will develop, but we hope it will be found reasonably complete and helpful, and the foundation for a final draft.

"The basis of the proposed franchise is the surrender of the company's existing franchise and entering into a partnership agreement between the city and the company to secure for the people of Minneapolis transportation at cost and proper control of the service, improvement and development of the street railway system, with the right reserved by the city to purchase and take over and operate the street railway system if it so elects.

"The necessity for a revision of the terms of the existing franchise is apparent from the constantly growing demands for new extensions to the present system. In addition there is the natural advantage to the city of making a new contract at this time, in order that it may participate in the company's surplus earnings, these earnings to be used either in fare reduction, creation of a fund for the ultimate purchase of the property, or for general reduction of taxation, as the city may decide.

"The entire surplus of this company, except the actual cash on hand, has, during the past few years, been invested in additions to plant and the extension of lines, and funds are not now available for that purpose. No additional bonds can be issued or sold under any existing mortgages or trust deed.

"It now seems proper and logical that we should briefly outline what, in our opinion, will be required in the way of additional capital prior to 1923. The normal growth of Minneapolis will require about fifty additional cars each year. The operation of these cars will make necessary additional power plant capacity, etc., at a cost of not less than $10,000 per car, completely equipped and placed in service. This alone means an annual cost for new capital of not less than $500,000.

"The constant additions to permanent pavements of the streets by the city adds another heavy burden, of which this company must bear its part. This, according to our experience, will amount to not less than 10 miles of single track per year. Under average conditions the new construction will cost $400,000 annually.

"All of the above will be required without building any new lines or extensions. The company is now confronted with a demand for the construction of new lines and extensions aggregating nearly 40 miles of track, or an increase of 20 per cent over the present track mileage in Minneapolis. The construction and equipment of these new lines and extension will cost not less than $3,000,000.

"In 1919 the management of this company must be prepared to pay a mortgage of $5,000,000.

"We summarize the above items as follows:

New capital required during the years 1917, 1918 and 1919:	
Normal requirements for additional cars, equipment and paving, at $900,000 per year	$2,700,000
Construction and equipment of new lines and extensions	3,000,000
First mortgage bonds, which must be paid, maturing in 1919	5,000,000
Total	$10,700,000

"It is our best judgment that this company must in the public interest be in a position to finance itself permanently to the extent of not less than $15,000,000 to meet its requirements for the coming seven years. It cannot finance itself on an economical or permanent basis without a satisfactory agreement with the city which will give investors confidence in its securities.

"The capital value of the company's property, as appraised by its engineers, is as follows:

Capital invested in the property, being cost to reproduce physical property new	$28,717,033
Capital invested in the development of the property	5,311,462
Value of water power leases	1,294,881
Total value of the property	$35,323,376

A detailed inventory and appraisal was submitted in separate volumes which accompanied the letter.

In the tentative franchise draft the company fixes the life of the new grant at thirty years from Jan. 1, 1918. The grant, however, would continue for another thirty years in the event of the failure of the city to condemn the property or to exercise its option to purchase. In section 2 is left a blank for the insertion of the details with respect to the extensions and new lines which the company may during the negotiations obligate itself to build. It is provided that the cost and expense of the new construction be borne and paid by the company, but that it be added to the capital value. These expenditures are to be certified by the city comptroller to the Council for approval.

It is proposed to fix the single fare at 5 cents for a continuous trip in one direction for each passenger more than six years old, non-transferable transfers to be given only on the payment of cash fare. The city is to have the right, however, to apply its share of the surplus earnings of the company to the reduction of fares, with power vested in the company to restore the original rate on thirty days' notice whenever the operating income is insufficient in either half of the year to pay one-half of the company's annual minimum interest return. In the event of the restoration to the original fare because of the inadequacy of any reduced rate, the losses to the company are all to be made good before another reduction is ordered.

A blank is left for the insertion of the capital value as it is finally agreed upon. It is proposed that the company be guaranteed a return of 7 per cent on the total capital value as agreed upon. After such payment to the company the remainder of the earnings is to be divided by the company and the city equally each year until July 1, 1923. For each of the remaining years of the original grant the city is to receive 75 per cent of the divisible surplus and the company 25 per cent. The right of purchase is reserved to the company on a year's notice on the basis of the value as agreed upon for the property as of the time of the dating of the franchise, plus the additions to capital value as certified to from time to time.

A city street railway commissioner is proposed. There are suggestions for the operation of a reserve for renewals and depreciation. In the event that the city shall not have purchased or acquired the property at the time of the expiration of the franchise, the city is to have the right to take over the property on the payment of the capital value or to transfer such right to others. The agreement in its final form is to go before the voters for their approval.

ATLANTA'S REIGN OF TERROR

Law and Order Finally Prevail Over Campaign of Violence in Which Thirty-one Cars Are Dynamited

With the election on Dec. 6 of Asa G. Candler as Mayor of Atlanta, Ga., followed two days later by sentences of ten years each imposed in Judge Ben H. Hill's criminal court on the first two men to be tried on the charge of dynamiting cars of the Georgia Railway & Power Company, it may be said the attempt to compel organization of the motormen and conductors of the company came definitely to an end. Officers of the company are confident the campaign of violence inaugurated on Sept. 30 and referred to previously in the ELECTRIC RAILWAY JOURNAL will not be renewed in any form.

In many respects the Atlanta agitation was remarkable. It had its beginning in the discharge of three men from the line department of the Georgia Railway & Power Company. That department was made up almost entirely of members of the International Brotherhood of Electrical Workers. The union demanded the reinstatement of the men. The demand was refused. A strike was threatened, called, and put into effect, everybody going out. William Pollard, an agitator from Springfield, Ill., had arrived on the scene by this time and taken charge. Pollard's activities were constant but his success small. The line department of the company was reorganized thoroughly and permanently with non-union workmen, and Pollard turned his attention to the railway department in retaliation for his defeat. Out of his work there grew the walk-out of about thirty-six platform men at 6 o'clock on the evening of Sept. 30. These men abandoned their cars on downtown streets or elsewhere without previous demand upon or parley of any kind with the Georgia Railway & Power Company. That night crowds pulled loyal men from their cars, took their caps and badges from them, cut trolley ropes, blockaded tracks, threw bricks and other missiles, and indulged in other violence. How the company withdrew its cars from service for the remainder of that night, about 9:30 o'clock, how the rioting was resumed next morning, Sunday, with the same result of suspension of service about 10 o'clock, how the leading citizens of Atlanta protested that Sunday afternoon to a called meeting of the city police board that the police were not doing their duty to restore order, how the "citizens' committee on law and order" was formed next day in the Chamber of Commerce, under chairmanship of Asa G. Candler, Democratic nominee for Mayor—these details and others were told in the ELECTRIC RAILWAY JOURNAL for Sept. 16, page 509; Oct. 7, page 740, and Oct. 14, page 853. The rioting continued, however, with lessening intensity for days, but finally on Oct. 5 culminated in dynamiting. At that time all lines had been returned to normal night and day schedules.

THIRTY-ONE CARS DYNAMITED

From Oct. 5 till Nov. 17 dynamiting of cars was done promiscuously. In all, thirty-one cars were dynamited before the end came, on the night of Nov. 15, when a car was dynamited on one of the suburban lines. On that day, William Pollard, original agitator of the campaign against the company, was indicted by the Fulton Grand Jury on two charges, one a misdemeanor and the other a felony, growing out of the distribution by him of certain dodgers luridly descriptive of "strike breakers" and "scabs." On the same day Sam Gable, formerly a railroad switchman, was convicted of rioting in East Point, a suburb, early in September, and was sentenced to pay a fine of $1,000 or serve twelve months in the chain gang.

Less than twenty-four hours after what proved to be the final instance of dynamiting, or on the night of Nov. 19, six men were arrested by the city police. Judge Hill called a special session of the grand jury for the following day. The men arrested were Frank Cleveland Jarvis, a striking electrician; Claude Leatherwood, a locomotive engineer; Henry Harcrout, an engineer; G. A. Mitchell, a fireman; Ernest Ridling, a steamfitter, and C. J. Hamilton, a plumber. Next day all but Ridling were indicted for a felony, the charge being that they had dynamite and fuses and caps in their possession for the purpose of committing a crime. On the day of these indictments, labor leaders of Atlanta announced to the newspapers the discovery of dictograph installations behind the wainscoting in the joint office of *The Journal of Labor* and the Atlanta Federation of Trades.

Pollard, who had been in jail since his indictment, gave bond that same day. W. L. McWaters, a railroad clerk, charged with stabbing one of the power company's non-union linemen, was put on trial again that day, his former hearing having resulted in a mistrial. McWaters later was found guilty and was sentenced to twelve months in the chain gang. A fine of $500 was also imposed in his case.

From Nov. 20 till Dec. 8 developments came rapidly. On Nov. 21 five more men were indicted, and on Nov. 24 a striking lineman was indicted for having participated in the dynamiting of a street car.

POLLARD TRIED FOR FELONY

The selection of a jury for the trial of Pollard began on Nov. 24, and on Nov. 27 the trial of the felony indictment, one of the two against Pollard, started with the introduction of P. S. Arkwright, president of the Georgia Railway & Power Company, as the first witness for the State.

Even though it ended on Dec. 5 in a mistrial, the Pollard case was regarded throughout the city as a tactical victory for the company. It was the instrument through which, under Judge Hill's statement that the "bridle was off" and that the whole season of agitation might be gone into exhaustively, the State was enabled to reveal the details of a situation with which only the police and the power company and a few others were acquainted truthfully.

One of the features of the felony indictment against Pollard was that it was drawn under a section of the Georgia criminal code that rarely has been invoked in this particular application since its enactment in 1866. It was charged that Pollard had caused to be printed and circulated a dodger headed "The Strike Breaker," which, in lurid words, classified "strike breakers" and "scabs" as humans worse than the most infamous traitors in Biblical and civil history. The language was represented as that of "a prominent clergyman" (unnamed in the dodger or elsewhere). With thinly veiled purport, it implied that the duty of every self-respecting man impels him to the extirpation of "scabs" and "strike breakers." The charge was made further that Pollard's purpose in causing these dodgers to be printed and distributed was incitement of riot, and that the specific objects of the intended riot were the lives of the loyal street car men, inhabitants of the State.

At the outset of the trial Pollard's attorneys admitted in his behalf that he had ordered 10,000 copies of the dodger to be printed, but the prosecution put the evidence in the record, anyway. Judge Hill became tired of the testimony on both sides to prove or disprove rioting, and asserted as the dictum of the court that "everybody within the sound of my voice knows there was rioting," and asked the attorneys to devote their attention to other matters. Motormen, conductors, passengers, inspectors and division superintendents of the street railway department, and numerous other witnesses, adduced evidence in behalf of the State's contention. The defense introduced character witnesses, mainly from the ranks of organized labor.

One of the sensations of the trial was the introduction by the State of two confessed car dynamiters, I. G. Williams and J. R. Wilson, who left their cars at Pollard's order. Wilson testified that on the night of Nov. 27 he participated in the dynamiting of a street car, using three sticks of dynamite which were among a supply he had obtained from I. G. Williams. He said he had been influenced into acts of violence by the speeches of Pollard.

The defense later introduced J. L. Carver, financial secretary of the union, who brought the local's books into court with him, and by his testimony sought to prove that no money was paid out of the treasury for unlawful purposes. The State grilled the witness to develop the methods of distributing funds, and finally demanded that the union's books be impounded. This was ordered by the court. A number of linemen and street car men who quit their work were introduced by the defense to prove that Pollard never had counseled violence, but always advised the men to use lawful means to win.

H. W. Mills and A. W. Bruce, owner and driver respectively of a taxicab service, testified regarding trips to

Gainesville and Lithonia for dynamite. Mills said the bill for the trips amounted to $40. He swore he explained in detail to Pollard what his men had done on the two trips, and that Pollard told him he would "take it up with the boys at the hall to-night and see what can be done." Mills swore a stranger came to him next day and paid the $40. G. S. Johnson, a general storekeeper of Lithonia, identified in court a suitcase as the one which some men who came in an automobile had filled with dynamite they bought from him. Johnson also identified a package of dynamite caps among its contents, but could not identify the dynamite or fuse or other contents. T. F. Johnson, superintendent of the transmission lines of the company, identified the suitcase and its contents as having been found beneath a line tower on which he and two other power company men captured two men, one a striking lineman, in the act of trying to ground the high-tension lines of the company.

AGITATORS DICKER FOR RECOGNITION

In his testimony in rebuttal for the State, President Arkwright of the company told of a visit to his office by W. C. Stradley, who represented himself as a member of the committee of strike sympathizers appointed to settle the contentions favorably to Pollard's followers. Mr. Arkwright continued that Stradley complained about the prolongation of the agitation, and urged the company to reconsider its flat refusal to meet any committee of outsiders on any phase of the matter; that Mr. Stradley said the expenses of the investigators that the union labor leaders had retained to probe the company's rates for electric light and power were very heavy, and that the committee would be glad to discontinue them, and would "call the whole thing off" at once if the company would recognize the car men's union. Mr. Arkwright testified that he replied that this offer to call off the rate agitation was a kind of blackmail similar to the dynamiting of cars, and that he refused to discuss it further. Mr. Stradley already had testified, under cross-examination, about this visit, but had said Mr. Arkwright's reply was that the company would give away light and power before it would recognize the union.

In a statement, not under oath, Pollard told the jury that he never dreamed "The Strike Breaker" dodger would result in rioting or violence, and that he did not believe it did so result, and that this was far from his purpose in distributing it.

While the Pollard trial was in progress the newspapers published that the police had received sworn confessions from J. Roy Gunter and J. W. Bolton, former conductor and motorman respectively, and A. L. Smith, former motorman, to the effect that they had participated, with J. R. Wilson and others, in the dynamiting of cars. During the progress of the Pollard trial, activities became general among the rank and file of organized labor and in jitney-bus circles in behalf of the independent candidacy of A. M. Corrie, a railroad engineer, for Mayor of Atlanta in opposition to Asa G. Candler, nominated by the Democratic city primary some weeks previously. Inasmuch as political contests in Atlanta are nearly always within Democratic party lines, Mr. Corrie's candidacy was a bold defiance of precedent. Moreover, Mr. Corrie announced his candidacy following organized labor's unsuccessful attempt to induce C. W. McClure, a local retail merchant, to run against Mr. Candler. While all this was going on, seventeen more men, nearly all former street car men or linemen, were indicted for having dynamite in their possession.

With the announcement of Mr. Corrie's candidacy for Mayor, the Candler forces reorganized and prepared to do the unprecedented thing of getting out a big Democratic vote on city election day. The Corrie platform was frankly pro-labor and anti-corporation. Behind it was the animus engendered in local labor minds by Mr. Candler's activity, following his nomination, at the head of the citizens' committee for law and order.

On election day, Dec. 6, immediately following the Pollard mistrial, J. R. Gunter, former conductor, was placed on trial for the street car dynamiting to which he already had confessed. He pleaded not guilty, but did not deny the confession, saying he made it because he was "scared." It took the jury six hours to arrive at a verdict of guilty, with recommendation to mercy.

Mr. Candler defeated Mr. Corrie for Mayor of Atlanta by a vote of 6164 to 3260.

J. L. Wilson, the second of the dynamiters, was tried on Dec. 7 for the street car dynamiting related in his signed confession. Like Gunter, he did not deny the confession, but said he made it after the detectives had drugged him. As in Gunter's trial, several witnesses were introduced by the State to corroborate the confession. The jury returned in forty minutes with a verdict of guilty, with recommendation to mercy.

On Dec. 8 Judge Hill sentenced Bolton and Wilson to ten years' imprisonment each, the maximum remaining to the court under the recommendation of the jury. In pronouncing sentence, the court said:

"This crime was deliberately planned and executed only because of a grievance against a corporation. Three people were injured and miraculously escaped death. It was a terrific case of dynamiting, a cowardly assault; and this court cannot conceive of any crime more enormous. While the jury has recommended mercy, I am compelled by a sense of duty—a profound sense of duty—to place a sentence on these men that will put a stop to the crime in the future."

The remaining accused car dynamiters in jail or under bond will be tried at the January term of court, to which Judge Hill deferred them all after the Wilson trial.

RAILWAY MAKES EDUCATIONAL DISPLAY

Louisville Railway Shows Operating Mechanism of New Modern Car at Local Electrical Exhibition

One of the most interesting of the displays at the electrical exposition held at Louisville, Ky., by the Jovian League during America's Electrical Week was that of the Louisville Railway. It was a display calling special attention to the developments which have been made in electric railway equipment in Louisville in the last twenty-five years. Signs painted on the walls of the booth referred to the display. On the rear wall of the booth was a sign with the dates 1890-1916. This read:

"Twenty-six years of electrical transportation. Cost of material has increased. Wages and supplies have advanced. Transfers were added. Rides are longer. Fare still 5 cents, the cheapest item in modern life."

On one of the side walls was the sign:

"1890—Cars not heated. No vestibules. Seated twenty. Cost of car, $1,500. One 20-hp. motor. See type of motor and equipment as shown in exhibit.

On the opposite wall appeared:

"1916—Cars now heated, vestibuled, and seat forty-one. Cost of modern car (Fourth Street type), $6,000. Four 50-hp. motors used. See type of motor and equipment as shown in exhibit."

Photographs illustrating present and former equipment, the various power houses and distributing stations, etc., were used largely on the walls. Another interesting display was that of sections of types of rails used by the company and its predecessors as far back as 1864. There were numbers of these sections which attracted a great deal of interest.

The principal exhibit was a mounted motor and wheel unit, together with the other equipment, resistance coils, air reservoir, pump, brake cylinder, controller, trolley pole, lightning arrester, circuit breaker, etc., as if in actual use on a car. For the display the company had led a trolley wire in from the street through a window and from time to time the man in charge of the display "started his car" greatly to the interest of the spectators. In contrast with the modern equipment thus displayed was one of the 20-hp. motors used on the cars of 1890. This was shown complete, with parts of the old-time controller, the lightning arrester, circuit breaker, resistance coils, hand brake, etc.

The display was worked out by Frank H. Miller, superintendent of motive power of the Louisville Railway, and was installed under his supervision. There was not another display in the exposition which got closer and more interested attention.

HEARINGS ON STATE OR CITY CONTROL

Mr. Busby for Home Rule—Mr. Insull for State Commission Rule for Chicago Utilities

A committee of the State Legislature of Illinois headed by Medill McCormick has been conducting hearings in Chicago to gather data and learn public sentiment on the question of whether Chicago's utilities should be regulated by the State Public Utilities Commission, by a local commission, or by the Chicago City Council. Samuel Insull, president of the Commonwealth Edison Company, chairman of the board of directors of the People's Gas Light & Coke Company, and a member of the board of directors of the Chicago Elevated System, and Leonard A. Busby, president of the Chicago Surface Lines, appeared before this committee. They took opposite positions in their preference.

On Dec. 11 Mr. Insull said that he favored the retention of the present state commission with its broad powers for both state and local utilities and added that it was the business of his companies to adjust themselves to whatever laws were passed. Two striking experiences during the past year in relation to regulation had convinced Mr. Insull that the affairs of the local utilities would be handled more effectively by a state commission. He referred to the prompt approval of a rate change for the Commonwealth Edison Company by the state commission as compared with the dilatory action of the City Council, whose consent seemed advisable to a proposed change of rate for the gas company before making application to the state commission. The matter had been under consideration for a year with nothing accomplished as yet. Mr. Insull said he was much opposed to dealing with matters of this kind directly through the City Council. The trend throughout the United States was toward state regulating bodies. It was a question of efficiency. He said that if there must be local control, he preferred control by a small local commission rather than by a cumbersome City Council.

Mr. Busby, speaking before the committee Dec. 12, favored control by a local transportation committee such as Chicago now has. He said he had had many associations with members of the Council in recent years, and that at present a better and more practical attitude existed than before toward the right solution of the transportation question. The City Council reflected public sentiment in Chicago, and was quite competent to deal with the transportation problems. He summarized his views by declaring that the least preferable system of regulation was the state commission, and next to this was the city commission. A city commission, if established, should have all the power and authority of the state commission. The people must be educated to understand that a public utility was for the purpose of serving the people, and that it must be operated at a profit. The important thing was whether regulation was approached from a political or a business standpoint. There had been a tendency for those with responsibility to cater to the things which they deemed popular. The public utilities were business enterprises and any sound regulation must adhere to business principles. He did not believe the substitution of a commission for council control would solve that phase of the question. Mr. Busby said that more frankness on the part of the utility management with the people it served would do much to bring about a right understanding.

FREE INDIANAPOLIS

The Associated Employers of Indianapolis, Ind., is sending to newspapers, trade publications and magazines generally, a pamphlet dealing with the political defeat of union labor leaders in Indiana and a statement of about 5000 words dealing with the failure of the effort to unionize the lines of the Indianapolis Traction & Terminal Company. The pamphlet is by Andrew J. Allen, secretary of the Associated Employers of Indianapolis, Inc. The situation with respect to the effort to induce a strike among the employees of the Indianapolis Traction & Terminal Company was covered fully in the articles which appeared in the ELECTRIC RAILWAY JOURNAL Nov. 4, Nov. 18 and Nov. 25, but the pamphlet and the statement about the Indianapolis strike show that the employers regard the failure of the strike and the defeat of organized labor at the November election as removing the stigma of undue influence from unionism to which industry there has been subjected.

TOLEDOANS POSTPONE CLEVELAND INSPECTION

The inspection trip which the street railway commission of Toledo, Ohio, had planned to make to Cleveland on Dec. 6 was postponed to Dec. 13, as the Cleveland men with whom the members desired to consult were out of the city.

On Dec. 5, President John Thurston and Judge Emery presented to the other members of the commission a plan for amortization, to be included in the proposed franchise. This was discussed and its provisions were agreed to tentatively, pending its presentation to Mr. Doherty.

H. G. Wilson, traffic commissioner of the Commerce Club, appeared before the commission and requested information as to the terms under which the cars of interurban railways are to be admitted to the city. He suggested the possibility of new lines entering the city and argued that they should receive as much consideration as the existing roads. Mr. Wilson told the commission that interurban freight service was going to become a very important factor. Steam roads were better fitted for long hauls, but electric railways were becoming the natural medium for hauls within 75 miles of the city. Mr. Wilson was assured the ordinance would be sent to all civic organizations for suggestions and criticisms before final action was taken on it.

Plan to Put Electric Railways Under Texas Commission.—Labor leaders in Texas, working through the organized committees of the State Federation of Labor, are seeking legislation that will place all interurban lines in the State under supervision of the Texas Railroad Commission.

Cleveland Arbitration.—Fielder Sanders, street railway commissioner of Cleveland, Ohio, and Henry J. Davies, secretary of the Cleveland Railway, testified before the board of arbitration in the power contract matter on Dec. 11. The first arguments were scheduled to begin the following day.

Rhode Island Property Being Valued.—A valuation of the property of the Rhode Island Company, Providence, R. I., is being made by Ford, Bacon & Davis, New York, N. Y. Rathbone Gardner, one of the federal trustees now in charge of the road, under instruction from the court to sell it within a certain period, states that the valuation is being made so the road's earnings may be correctly ascertained.

Composite Cars in Use on Elevated.—The Interborough Rapid Transit Company, New York, N. Y., has placed in operation on the Third Avenue elevated line the first train of the "composite" cars which were removed from the first subway before April 1 of this year upon order of the Public Service Commission for the First District. This and other similar trains are to be used in express service on the Second and Third Avenue elevated lines.

Co-operation Posters.—The National Association of Manufacturers, New York, N. Y., has issued three new series of posters. They are intended primarily for use in industrial plants, but many of them are suitable for railway work. Three of them read as follows: "The Best Form of Monopoly for Capital or Labor Is Co-operation"; "The Efficiency of This Organization Depends Upon the Co-operation of Its Units"; "Industrial Prosperity Depends Upon Industrial Peace."

New Working Agreement on Seattle Suburban Line.—Following negotiations between Walter M. Brown, manager of the Seattle, Renton & Southern Railway, Seattle, Wash., and S. J. Wallace, president, and the executive officers of local No. 587 of the Amalgamated Association, a new scale of wages went into effect on the road recently. Under the new wage scale the maximum rate of pay will be reached after three years of continuous service. It is also provided that no run shall pay less than ten hours' wages, regardless of its length.

Cleveland Commissioner Designs Car.—Fielder Sanders, street railway commissioner of Cleveland, Ohio, has designed a car which he hopes will be adopted as the standard on the Cleveland Railway. He told the street railway committee of the City Council recently that from 150 to 200 of the company's 1052 motor cars were in the shops for repair all the time and that new cars must be secured in the near future. He asked that the fifty cars authorized by the Council some months ago be built to the new standard in the company's shops.

Subway Emergency Exits Being Installed.—Following notices of approval from Fire Commissioner Adamson, the Public Service Commission for the First District of New York has directed the Interborough Rapid Transit Company to make an installation of additional ladders and stairways to be used as emergency exits from the first subway to the street in case of fire or accident. When these are installed all of the recommendations for changes in the subway made by the Public Service Commission following the accident at Fifty-third Street in January, 1915, will have been carried out or will be under way.

Cincinnati Entrance Proposal Renewed.—John E. Bleekman, of the White-Bleekman interests, New York, was in Cincinnati recently. He said that the interests which he represented stood ready to undertake the consolidation of the interurban roads into Cincinnati and build an entrance for them, sharing any profits that may result on a fifty-fifty basis with the city. They would not undertake to build a loop, because they did not believe that a loop could ever be operated at a profit, but they would give the city a rapid transit service in all directions, which would answer the purpose that is expected to be filled by the proposed loop.

Adamson Law Argument on Jan, 8.—The Supreme Court of the United States on Dec. 11 indicated its purpose to give prompt consideration of the Missouri, Oklahoma & Gulf Railroad injunction case, better known as the Adamson law case. Chief Justice White said that the court would hear the arguments on Jan. 8, 1917, and the hearing would be placed at the head of the calendar for that day. In the meantime the law itself, under the decision of Judge Pollock, United States District Judge for the western district of Missouri, and the agreements by the railroad and government attorneys, will be held in abeyance. The law was enacted on Sept. 9 last, to go into effect on Jan. 1, 1917.

Newlands Committee Inquiry Halted.—The Newlands joint congressional committee, which has been investigating railroad problems since Nov. 20, concluded its hearings on Dec. 9, until the end of the present session of Congress. The resolution under which it was commissioned provided that its work should end Jan. 8, 1917, and special permission from Congress will have to be obtained if it continues its sessions after that date. Congress is expected to grant the extension. It has been the understanding almost since the hearings began that the committee would not be able to complete its investigation within the time allotted. With the opening of Congress and the pressure for immediate railway legislation, the members of the committee have decided that they cannot give the investigation the attention it requires and they have determined therefore to postpone it.

Bill to Force Paving in Seattle.—A bill has been introduced in the Council at Seattle, Wash., directing Hugh M. Caldwell, Corporation Counsel, to bring an action against the Puget Sound Traction, Light & Power Company to require it to pave its right-of-way, at the same time and with the same material with which the rest of the street is paved, as soon as the Board of Public Works makes certification of such failure. The introduction of this bill followed the action of Mayor H. C. Gill in advising Corporation Counsel Caldwell that such an action should be brought only by authority of an ordinance, rather than on a report of the franchise committee as proposed. The company is seeking before the Public Service Commission to be freed from paving requirements, the payment of any part of the cost of bridges, and the payment of the 2 per cent tax of the city of its gross earnings.

Operation of First Trolley in Scranton Recalled.—Nov. 29 marked the thirtieth anniversary of the use of electricity in propelling street cars in Scranton, Pa. As the Scranton Suburban Street Railway, now the Scranton Railway, was one of the first roads to apply electricity successfully for the purpose of carrying passengers, the anniversary of the event was recalled by the Scranton *Times*, which published in its issue of Nov. 29 an article reviewing the history of the undertaking and recalling some of the vicissitudes attendant upon the opening of the line for service. E. B. Sturges, who promoted the road, contributed a letter in which he reviewed some of the incidents connected with the opening. The article was accompanied by portraits of W. E. Boileau, the present manager of the Scranton Railway, Mr. Sturges, and the first motorman and the first conductor on the road.

Sees Excellent Trade Possibilities in Brazil.—James A. Farrell, president of the United States Steel Corporation, president of the India House and chairman of the National Foreign Trade Council, believes that a great field for the application of surplus United States capital lies in Brazil. In an article written for *The South American* Mr. Farrell has outlined the reasons for his belief that there is a great chance for United States money and brains in the great South American republic. With respect to the prospects in the public utility field, Mr. Farrell says: "All cities of any importance in the interior are sooner or later provided with electric light, and a large proportion of the equipment for lighting plants has come from the United States. In the future this should be more largely American, and contractors should obtain first-hand information in regard to the numerous waterfalls which are suitable for the generation of power."

I. T. S. Again Seeks Terminal Connection.—The St. Louis Electric Terminal Railway Company, included in the Illinois Traction System, Peoria, Ill., began the presentation of arguments on Dec. 6, at the Planters' Hotel, St. Louis, before Eugene McQuillin, a member of the State Public Service Commission, in support of its application to connect its tracks with those of the Terminal Railroad Association. T. M. Pierce, general counsel for the Terminal Railroad Association, urged that the petition be denied, on the ground that "the Illinois Traction System has violated ordinance provisions made by the city." This was denied by Henry I. Greene of Urbana, Ill., attorney for the Illinois Traction System, who demanded that proof be given. Two attempts were defeated in the session of the Municipal Assembly of 1912-1913 to obtain a franchise making the Illinois Traction System a freight carrier on the Missouri side of the river. The system at the present time has connection with the rails of the Terminal Railroad Association in Granite City.

Subway Urged on Fulton Street. — The Fulton Street Subway League of Brooklyn has submitted to the Public Service Commission for the First District of New York a long statement of reasons why a "trunk line" subway should be built up Fulton Street to East New York. The commission and the Board of Estimate have also received a petition containing nearly 4000 names urging the subway. The league objects to the third-tracking of the Fulton Street elevated road because "a three-track road has at most a capacity only 20 per cent greater than a two-track road," and because a three-track road "is utterly inadequate as a means of caring for the traffic to be handled, obviously, therefore, within five years, the congestion on the Fulton Street line will be intolerable." The statement predicts great damage to the property owners if the proposed three-track road is built on lower Fulton Street. The attitude of President Williams of the Brooklyn Rapid Transit Company toward the removal of the elevated structure on lower Fulton Street and on elevated roads in general was reviewed in the ELECTRIC RAILWAY JOURNAL of Jan. 2, 1915, page 71.

Leonard A. Busby Cites Need for Transportation Expansion in Chicago.—Before the weekly luncheon of the Chicago Real Estate Board, Leonard A. Busby, president of the Chicago Surface Lines, discussed the advance disclosures of the report of the Traction and Subway Commission, and emphasized the fact that it was a problem of concern to every citizen of Chicago, and to every business interest. He said the transportation problem could be solved successfully if the people of the city would look at it as a business proposition, to be settled in a business way. Chicago's population was increasing at the rate of more than 60,000 a year. The service requirements were increasing still more rapidly, as was shown by the rapid increase in riding per capita, an increase from 240 rides per capita in 1902 to 350 rides per capita at the present time. Within ten years the population of Chicago would be more than 3,000,000. To meet the demands of this larger population and increased service requirement would require a minimum increase in existing transportation facilities of 40 to 50 per cent.

Financial and Corporate

ANNUAL REPORT

Aurora, Elgin & Chicago Railroad

The comparative income statement of the Aurora, Elgin & Chicago Railroad, Wheaton, Ill., for the years ended June 30, 1915 and 1916, with revenue and expense percentages based on gross revenues, is as follows:

	1916		1915	
	Amount	Per Cent	Amount	Per Cent
Gross revenues:				
Revenue from transportation	$1,635,190	83.8	$1,632,083	82.9
Revenue from operations other than transportation	315,320	16.2	336,285	17.1
Miscellaneous	....	...	581	0.0
Total gross revenues	$1,950,510	100.0	$1,968,949	100.0
Operating expenses and taxes:				
Maintenance of way and structures	$178,682	9.2	$194,590	9.9
Maintenance of equipment	100,448	5.1	132,555	6.7
Power	203,954	10.4	235,933	12.0
Traffic	19,265	1.0	20,896	1.1
Conducting transportation	417,682	21.4	411,506	20.9
Other operations	29,745	1.6	31,270	1.6
General and miscellaneous	297,845	15.3	295,596	15.0
Total	$1,247,621	64.0	$1,322,346	67.2
Less undistributed operating credits	2,868	0.2	4,955	0.3
Remainder	$1,244,753	63.8	$1,317,391	66.9
Taxes	54,749	2.8	41,956	2.1
Total operating expenses and taxes	$1,299.502	66.6	$1,359,347	69.0
Operating income	$651,008	33.4	$609,602	31.0
Other income	257	0.0	278	0.0
Gross income	$651.265	33.4	$609.880	31.0
Deductions	489,210	25.1	443,437	22.5
Net income	$162,055	8.3	$166,443	8.5

Although the annual report of this company does not contain any earnings figures for preceding fiscal years, a comparison of the 1916 returns with those previously published for 1915 shows that a substantial gain was made in gross income in the last year, while the net income dropped slightly. In 1915, it was stated that for the first time in the company's history the gross income had suffered a material decrease, the falling-off reaching a total of $89,512 or 12.8 per cent.

The better showing in gross income in 1916 was made mostly by savings in operating expenses. The revenue from transportation showed a slight increase of $3.107 or 0.2 per cent but the revenue from other operations decreased $20,965 or 6.2 per cent, so that the total revenues (including miscellaneous revenues) fell off $18,439 or 0.9 per cent. The total operating expenses, less undistributed operating credits, were cut $72,638 or 5.5 per cent, all the groups showing decreases except conducting transportation and general and miscellaneous. The saving made, however, was partly lost through an increase of $12.793 or 30.5 per cent in taxes. The operating income, therefore, increased $41,406 or 6.8 per cent.

The deductions from income increased $45.773 or 10.3 per cent, so that the final result was a decrease of $4,388 or 2.6 per cent in net income. The deductions from income in 1916 included an item of $31.493 for depreciation of equipment and $21,068 for amortization of debt discount and expense. The profit and loss surplus at the end of the year, with no dividend paid on the 6 per cent cumulative preferred stock amounting to $3,100,000, showed a total of $733.171.

During the year the company took advantage of the high price of scrap aluminum to replace all its aluminum high-tension lines (except from Wheaton to Lombard) with new copper wire equivalent to—and in some cases of greater carrying capacity than—the old aluminum wire. The proceeds of the sale of aluminum provided for the cost of the new copper wire and the cost of alteration, with a substantial margin of profit to the company resulting from the change in construction.

American International Corporation

The first report of the American International Corporation, New York, N. Y., or a preliminary report to the stockholders at the annual meeting, states that in the year's operations a definite policy has been persistently followed, always having in view the co-ordinated development of an export and import trade, the use of American materials and manufacturers abroad, the employment of American capital and engineers in constructive foreign enterprises, and finally the enlargement of a system of ocean transportation under the United States flag.

No less than 1230 propositions seeking financial support and development were presented to the corporation for investigation. Transportation and communication (railroads, tramways, shipping terminals, telephones) headed the list with a total of 332 cases, and public utilities (light, power, water, buildings) added 127 proposals. Of the total 917 propositions were declined, the remainder not yet being settled.

The proposals actually accepted and undertaken included the Uruguayan contract for the construction of waterworks and sewerage systems, the American International Terminals Corporation and the Chinese railroad concession. In addition, the corporation acquired interests in the Pacific Mail Steamship Company, the Allied Machinery Company of America, the International Mercantile Marine Company and the New York Shipbuilding Company. A special corporation was formed to take care of South American work; the Rosin & Turpentine Export Company was organized and an interest was acquired in the United Fruit Company and in the tea-importing business

RAILWAY EARNINGS FOR SEPTEMBER

Comparative Returns for 1915 and 1916 Show Improvement in Western District—New York Strike Had Bad Effect

A comparison of electric railway statistics for September, 1916, with figures for the corresponding month of 1915, made by the information bureau of the American Electric Railway Association, indicates an encouraging improvement in the traction business of the Western District of the United States. Labor disturbances in New York City, however, have had a considerable effect upon the returns from the Eastern District and consequently upon the returns for the United States as a whole. Data for September, representing 7067 miles of line of companies scattered throughout the country, show a decrease in operating revenues of 2.25 per cent, in operating expenses of 1.86 per cent and in net earnings of 2.80 per cent, while data representing 5806 miles of line indicate an increase in taxes of 8.15 per cent and a decrease in operating income of 5.71 per cent.

Of the three groups shown in the accompanying table the Eastern, represented by 4356 miles of line or about 60 per cent of the total mileage, suffered a decrease in operating revenues of 5.20 per cent, in operating expenses of 4.14 per cent and in net earnings of 6.60 per cent. Returns representing about 80 per cent of this mileage show an increase in the amount of taxes paid of 6.32 per cent and a decrease in operating income of 9.73 per cent. The returns from electric railways in the Eastern District, however, exclusive of those involved in the New York City strike, indicate an increase in operating revenues for this district of 8.49 per cent, in operating expenses of 4.35 per cent and in net earnings of 13.67 per cent. A similar elimination from the returns of those companies reporting taxes shows an increase in the operating income for the Eastern District of 15.21 per cent.

According to the reports of the Public Service Commission for the First District of New York, the electric railways involved in the New York City strike, exclusive of the Interborough Rapid Transit Company, earned in September, 1915, approximately $2,500,000 and expended, exclusive of taxes, about $1,500,000. A comparison with the corresponding figures for September, 1916, indicates a decrease in operating revenues of about 50 per cent and in operating expenses of about 30 per cent. The effect of these decreases upon the totals involved is thus self evident.

The Southern group, represented by 756 miles of line, showed increases in operating revenues, expenses and net earnings, the latter amounting to 5.43 per cent. Companies represented by 506 miles of line had an increase in the amount of taxes paid of 2.77 per cent, and in operating income one of 6.01 per cent.

Data for the Western group, represented by 1955 miles of line indicate an encouraging improvement. Operating revenues increased 4.53 per cent, operating expenses 2.11 per cent and net earnings 8.77 per cent. In spite of an increase of 13.95 per cent in the amount of taxes paid by companies represented by approximately 85 per cent of the above-stated mileage, the operating income increased 7.51 per cent.

Increases in the operating ratio became apparent, the operating ratio of the United States as a whole increasing from 58.29 per cent in 1915 to 58.52 per cent in 1916. Of the three districts the Western alone showed a decrease in the operating ratio, though its operating ratio was the highest of all.

REVENUES AND EXPENSES OF ELECTRIC RAILWAYS FOR SEPTEMBER, 1916

	Companies Not Reporting Taxes		Companies Reporting Taxes	
*United States**	Amount	Per Cent Increase	Amount	Per Cent Increase
Operating revenues	$14,615,153	†2.25	$13,694,569	†3.06
Operating expenses	8,553,200	†1.86	8,025,889	†2.65
Net earnings	6,061,953	†2.80	5,668.680	†3.62
Taxes	....	...	959,678	8.15
Operating income	....	...	4,709,002	†5.71
Operating ratio, per cent:				
1915	58.52	...	58.60	...
1916	58.29	...	58.36	...
Miles of line represented	7,067	...	5,806	...
*Eastern District**				
Operating revenues	10,126,148	†5.20	9,661,525	†5.96
Operating expenses	5,813,153	†4.14	5,559,852	†4.81
Net earnings	4 312,995	†6.60	4,101,673	†7.48
Taxes	....	...	660,048	6.32
Operating income	....	...	3,441,625	†9.73
Operating ratio, per cent:				
1915	57.41	...	57.55	...
1916	56.77	...	56.85	...
Miles of line represented	4,356	...	3,549	...
*Southern District**				
Operating revenues	837,365	7.85	536,921	7.09
Operating expenses	466,600	9.85	282,150	8.56
Net earnings	370.765	5.43	254,771	5.51
Taxes	....	...	38,101	2.77
Operating income	....	...	216,670	6.01
Operating ratio, per cent:				
1915	55.72	...	52.55	...
1916	54.70	...	51.84	...
Miles of line represented	756	...	506	...
*Western District**				
Operating revenues	3,651,640	4.53	3,350,539	4.34
Operating expenses	2,273,447	2.11	2,143,796	1.87
Net earnings	1,378,193	8.77	1,206 743	8.74
Taxes	....	...	229,504	13.95
Operating income	....	...	977,239	7.51
Operating ratio, per cent:				
1915	62.26	...	62.46	...
1916	63.72	...	63.98	...
Miles of line represented	1,955	...	1,751	...

†Decrease.

* Groupings are as follows: *Eastern District*—East of the Mississippi River and north of the Ohio River, exclusive of Greater New York. *Southern District*—South of the Ohio River and east of the Mississippi River. *Western District*—West of the Mississippi River.

BOSTON ELEVATED ISSUES CONCLUDING STATEMENT

At a hearing on Dec. 7 before the special commission investigating its revenue problem, the Boston (Mass.) Elevated Railway issued a concluding statement relative to points brought out in the recent sessions, in which the road replied to various statements in opposition to certain plans for increasing net earnings. The company pointed out that no justification existed for the statement that the probable increase in the road's business during the next three years would take care of the increased cost of operation and the increased charges which must be faced.

The federal income tax on net earnings had recently been increased from 1 per cent to 2 per cent. Congress had imposed a new corporation tax of 50 cents per $1,000 on the par value of the stock, after July, 1917. During the fiscal year 1919 a further increase in wages estimated to cost the company at least $200,000 more for the same amount of service rendered will become due and there will also be increased charges on additional capital. Sufficient income should be available to enable the substitution of new and improved equipment for existing equipment.

F. E. Snow of Gaston, Snow & Saltonstall, general counsel for the company, said that the management expenses of the company were reasonable. It was considered a measure of prudence to retain the services of the company's former president following the election of Mr. Brush to the chief executive office of the company. Mr. Snow also said that the legal department of the company was efficiently conducted. He cited the great volume of work handled by it annually.

The statement contended that the Public Service Commission was well informed as to the company's financial necessities, and that the board was in a position to advise the special commission without outside investigation. The company had no objection to the latter, but felt that its status was entirely clear, and that if any additional investigation was deemed necessary, it could be completed within so short a time as not to delay seriously the final action of the commission. The solution of the situation lay in the State designating a representative to sit on the board of directors and take part in the determination of questions of policy and expenditures when and as they are made. The company would welcome any such representative to its board.

RUNNING CANADIAN MUNICIPAL RAILWAYS—MOSTLY AT A LOSS

According to reports from Canada the Brandon Municipal Street Railway has proved an expensive luxury, and, it is estimated by the civic authorities, has cost the city approximately $50,000 this year, an average monthly loss of about $4,000. The street railway of Regina has cost that city $40,000 to operate so far this year. The Lethbridge Municipal Railway has cost approximately $8,000. In practically every city in western Canada the municipal street railways are said to be proving themselves merely sink holes for public funds.

The street railway system in Saskatoon, however, which at one time was regarded as a losing proposition, has so far this year shown a profit of $7,000. Part of the showing is due to the profitable operation of the exhibition route during part of last winter when the military were stationed at the grounds, but apart from that the railway has picked up. The Saskatoon *Phœnix* states that the Council became determined that the street car system must be made to pay and instructed the street railway superintendent to that effect. The kicks of particular sections of the city that wanted a street car service entirely out of proportion to the amount of traffic carried were disregarded to a great extent, and the system was run on "business-like" lines. The use of double-truck cars was discontinued in a great measure, and the routes were somewhat reorganized by competent men. As a result, it is claimed, the present service is on time, efficient and paying.

American Railways, Philadelphia, Pa. — The American Railways has deposited with the Pennsylvania Company for Insurances on Lives & Granting Annuities, trustee under the deed securing the three-year 5 per cent notes of the railway, the sum of $631,140 to redeem on Feb. 1, 1917, notes of a similar amount of the issue mentioned previously.

Bay State Street Railway, Boston, Mass.—The Massachusetts Public Service Commission has authorized an issue of $2,500,000 of 6 per cent serial notes by the Bay State Street Railway. The notes are to mature in from one to seven years. The proceeds are to be used to pay for reconstructing track and overhead equipment and for replacing rolling stock and other property. In the ELECTRIC RAILWAY JOURNAL of June 10, page 1107, mention was made of an application to the commission to issue $2,750,000 of 5 per cent coupon notes to be dated Aug. 1, 1916, and to mature serially on annual interest dates for seven years. These notes were to be part of $3,500,000 authorized on March 9, 1916.

Charlottesville & Albemarle Railway, Charlottesville, Va.—At a meeting of the directors of the Charlottesville & Albemarle Railway, held on Dec. 9, a semi-annual dividend of 3½ per cent was declared on the preferred stock, and 2½ per cent on the common stock. This makes a total of 7 per cent on the preferred stock, and 5½ per cent on the common stock, for the year.

Cleveland (Ohio) Railway.—The operating report of the Cleveland Railway Company for October shows overdrafts of $87,539 in the operating fund and $17,908 in the maintenance fund. The total operating revenue was $826,386. The poor showing was due to the fact that damage claims, resulting from the West Third Street disaster, amounted to $120,123 as compared with $35,981 paid out for the same purpose in the corresponding month last year. The revenue from the penny charge for transfers was $71,906. A small ordinance surplus was shown, but there was an actual deficit of $75,158. The total number of passengers for the month was 32,471,237, an increase of 8.78 per cent over the number carried in October, 1915. It is asserted that the increase in the service under the control of the city was 3.59 per cent, which meant that the cars were crowded much more than a year ago. The amount added to the interest fund was $4,290, which brought this fund up to $475,562. This must reach $700,000 before a reduction in fare can take place.

Electric Bond & Share Company, New York, N. Y.—William P. Bonbright & Company, New York, N. Y., have sold $2,000,000 of 6 per cent cumulative preferred stock of the Electric Bond & Share Company at $100 a share and the dividend. The company has authorized and outstanding $8,000,000 of preferred stock and $8,000,000 of common stock. The common stock is owned by the General Electric Company. The preferred stock is callable on ninety days' notice on any dividend date at the amount of 110 and accrued dividend.

Interborough Consolidated Corporation, New York, N. Y.—Henry V. Rice, a holder of preferred stock of the Interborough-Metropolitan Company, in his own behalf and for "other holders who may care to join him," has filed a suit in the Supreme Court in New York asking that a receiver be appointed for all the properties and funds of the company as constituted in June, 1915. He also asks that Theodore P. Shonts, Cornelius Vanderbilt, August Belmont and other directors of that period be compelled to render an accounting of all property turned over to the Interborough Consolidated Corporation, the successor to the Interborough-Metropolitan Company. Mr. Rice alleges, upon information and belief, that the directors effected a consolidation with the approval of the holders of a majority of the Interborough-Metropolitan shares and thereby "defrauded" the holders of the preferred stock out of 57 per cent in accumulated dividends. The aggregate of the 57 per cent would amount to $26,071,800. He further alleges that for the purpose of destroying the value of the company the defendants had the securities stricken from the list of Stock Exchange securities and as a result the stock became unmarketable and is not a collateral for banks. Mr. Rice asks that the consolidation be declared null and void and the Interborough-Consolidated Corporation be enjoined from exercising any control over the Interborough-Metropolitan property.

Knoxville Railway & Light Company, Knoxville, Tenn.—Reilly, Brock & Company, Philadelphia, Pa., and Bertron, Griscom & Company, New York, N. Y., are offering for subscription at 92¾ and interest to net 5½ per cent $1,556,000 of refunding and extension mortgage 5 per cent gold bonds of the Knoxville Railway & Light Company dated July 1, 1911, and due June 1, 1946.

Northern Ohio Electric Corporation, Akron, Ohio.—The Northern Ohio Traction & Light Company, the operating subsidiary of the Northern Ohio Electric Corporation, has petitioned the Ohio Public Utilities Commission for authority to issue $1,000,000 of common stock at par, the proceeds to be used for new construction and extensions. The new stock will be taken by the parent corporation, which owns 95 per cent of the present outstanding stock of Northern Ohio Traction & Light Company.

United Railways, St. Louis, Mo.—A committee consisting of L. H. McHenry, Louisville, chairman; J. A. Cheek, Danville, Ky.; George E. Dieckman, St. Louis; J. B. Downing, Jr., Middleport, Ohio; H. P. Wilson, New York, and A. J. Scharf, Louisville, has been organized in the interest of the holders of the stock of the United Railways, and is seeking proxies for use at the annual meeting of the company in February. Mr. Dieckman is quoted as follows: "Letters are being sent to the preferred stock holders asking them to send their proxies to the committee in order that we may be able to finish our investigation and be in a position to take some action at the annual meeting of the United Railways in February. Our investigation will be entirely friendly. There must be some way to put this corporation on a paying basis, and that is what we want to do." This is the third committee to be organized to secure proxies.

DIVIDENDS DECLARED

Cleveland (Ohio) Railway, quarterly, 1½ per cent.

El Paso (Tex.) Electric Company, 3 per cent, preferred; quarterly, 2½ per cent, common.

Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y., quarterly, 1½ per cent, preferred.

Interborough Consolidated Corporation, New York, N. Y., quarterly, 1½ per cent, preferred.

Interborough Rapid Transit Company, New York, N. Y., quarterly, 5 per cent.

Manila Electric Railroad & Lighting Corporation, Manila, P. I., quarterly, 1½ per cent.

Springfield Railway & Light Company, Springfield, Mo., quarterly, 1¾ per cent, preferred.

Toronto (Ont.) Railway, quarterly, 2 per cent.

Tri-City Railway & Light Company, Davenport, Ia., quarterly, 1½ per cent, preferred; quarterly, 1 per cent, common.

Twin City Rapid Transit Company, Minneapolis, Minn., quarterly, 1½ per cent, preferred; quarterly, 1¾ per cent, common.

Union Traction Company, Philadelphia, Pa., $1.50.

United Traction & Electric Company, Providence, R. I., quarterly, 1¼ per cent.

West End Street Railway, Boston, Mass., $2, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

Period		Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
AURORA, ELGIN & CHICAGO RAILROAD, WHEATON, ILL.						
1m., Oct.,	'16	$173,987	*$115,884	$58,103	$35,819	$22,284
1 " "	'15	167,520	*106,308	61,212	37,368	23,844
4 " "	'16	764,826	*495,547	269,279	143,804	125,475
4 " "	'15	713,317	*462,659	250,658	147,126	103,532
BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, ME.						
1m., Oct.,	'16	$77,173	*$40,480	$36,693	$18,131	$18,562
1 " "	'15	71,610	*35,587	36,023	17,613	18,410
12 " "	'16	815,966	*445,574	370,392	213,083	157,309
12 " "	'15	785,895	*392,726	393,169	212,211	180,958
CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN.						
1m., Oct.,	'16	$109,024	*$82,197	$26,827	$29,925	†$3,098
1 " "	'15	98,155	*62,535	35,620	30,240	5,380
12 " "	'16	1,225,482	*786,082	439,400	355,838	83,562
12 " "	'15	1,057,096	*723,875	333,221	356,814	†23,593
CLEVELAND, PAINESVILLE & EASTERN RAILROAD, WILLOUGHBY, OHIO						
1m., Oct.,	'16	$38,570	*$23,645	$14,925	$11,490	$3,435
1 " "	'15	36,284	*18,613	17,671	11,083	6,588
10 " "	'16	390,147	*220,471	169,676	114,042	55,634
10 " "	'15	358,405	*195,016	163,389	109,841	53,548
CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, ME.						
1m., Oct.,	'16	$251,683	*$155,117	$96,566	$69,144	$27,422
1 " "	'15	226,793	*130,373	96,420	65,507	30,913
12 " "	'16	2,828,567	*1,726,598	1,101,969	805,943	296,026
12 " "	'15	2,598,663	*1,482,210	1,116,453	785,452	331,001
FEDERAL LIGHT & TRACTION COMPANY, NEW YORK, N. Y.						
1m., Oct.,	'16	$201,809	*$121,866	$79,943	$48,708	$31,235
1 " "	'15	194,227	*129,104	65,123	48,693	16,430
10 " "	'16	2,062,032	*1,373,167	688,865	487,233	201,632
10 " "	'15	1,917,058	*1,270,603	646,455	492,292	154,163
LAKE SHORE ELECTRIC RAILWAY, CLEVELAND, OHIO						
1m., Oct.,	'16	$136,113	*$84,878	$51,235	$36,521	$14,714
1 " "	'15	118,314	*75,475	42,839	36,283	6,556
10 " "	'16	1,343,126	*838,007	505,119	363,827	141,292
10 " "	'15	1,150,649	*746,619	404,030	361,116	42,914
LEHIGH VALLEY TRANSIT COMPANY, ALLENTOWN, PA.						
1m., Oct.,	'16	$218,345	*$134,182	$84,163	$52,586	‡$43,029
1 " "	'15	196,650	*110,709	85,941	55,129	‡42,010
12 " "	'16	2,455,030	*1,493,810	961,220	631,503	‡467,090
12 " "	'15	2,019,889	*1,185,108	834,781	664,890	‡303,312
PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.						
1m., Oct.,	'16	$459,720	*$248,407	$211,313	$181,280	$30,033
1 " "	'15	453,225	*257,246	195,979	182,766	13,213
12 " "	'16	5,429,252	*3,043,952	2,385,300	2,178,247	207,053
12 " "	'15	5,582,361	*3,080,788	2,501,573	2,209,207	292,366
NEW YORK & STAMFORD RAILWAY, PORT CHESTER, N. Y.						
1m., Oct.,	'16	$24,460	*$23,641	$819	$7,987	†‡$7,108
1 " "	'15	28,216	*24,278	3,937	8,004	†‡4,011
4 " "	'16	141,617	*105,238	36,379	31,948	‡4,654
4 " "	'15	161,567	*111,030	50,537	32,005	‡18,796

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*Includes taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

I. C. C. DECISION FAVORS I. T. S.

Government Body Holds That a City Cannot Indirectly Control or Regulate Interstate Commerce by a Franchise Condition

In the ELECTRIC RAILWAY JOURNAL of Dec. 9, page 1222, brief mention was made of the decision rendered by the Interstate Commerce Commission on Dec. 4 in which it found to be justified certain increases in fare proposed by the Illinois Traction Company, Peoria, Ill., for the transportation of passengers between St. Louis, Mo., and Venice, Madison and Granite City, Ill. In its ruling the commission held that interstate fares prescribed by a municipality are not conclusively presumed to be reasonable even if accepted by the interstate carrier as one of the conditions of a franchise. In addition to holding that the St. Louis Electric Terminal Railway, a subsidiary of the Illinois Traction Company, is a common carrier of passengers and freight in interstate commerce and as such is subject to the jurisdiction of the commission, that body tentatively approved the tariff item of the company providing for the sale of commutation tickets valid only during specified rush hours.

By the tariff under investigation the Illinois Traction System proposed to increase from 5 cents to 10 cents the fare for the transportation of passengers over its line between St. Louis, Mo., and points in the towns of Venice, Madison and Granite City, Ill., north of the Main Street station in Venice. New commutation fares and strip tickets were also proposed. Upon protests filed on behalf of the municipalities and by commercial organizations in St. Louis and Granite City the operation of the schedules in question was suspended until Dec. 29, 1916.

Prior to 1910 the lines of the system extended only as far south as Granite City, the southern terminus of the St. Louis, Springfield & Peoria Railroad, and it was deemed necessary or advisable to seek an entrance into St. Louis. The terminal company and the bridge company were then organized and an ordinance granting the necessary franchise rights was obtained from the city of St. Louis. Section 10 of the ordinance by which the municipal assembly of the city of St. Louis authorized the company to construct an electric railway along certain designated streets provided inter alia that "the charge for a continuous passage for an adult passenger between any point in said city of St. Louis on the line of said railway company and any point in Granite City and intermediate points in the State of Illinois, or return from said points in Illinois to points within the city of St. Louis on the line of said St. Louis Electric Terminal Railway shall not exceed 5 cents."

TEXT OF DECISION

In its decision the commission says in part:

"It is clear that the charging and collecting of the fare of 10 cents proposed in the tariff under investigation would directly contravene this provision of the ordinance. On behalf of the city of St. Louis it is contended that 'the rate incorporated in this franchise at the request of the St. Louis Electric Terminal Railway, and accepted by this company, is to be conclusively presumed by the commission to be reasonable as against any complaint made by the St. Louis Electric Terminal Railway.'

"The respondent replies that it accepted this provision of the ordinance because it was obliged to do so as a condition precedent to obtaining the necessary franchise rights; that it did so in good faith, with the expectation that so much passenger and freight traffic would be developed and so many benefits would accrue to the traction system as a whole, that the fare of 5 cents per passenger would prove remunerative; that the volume of freight and passenger traffic has been much smaller than was anticipated, with the result that for more than four years these companies have sustained heavy losses; and that, in any event, the provision in the ordinance fixing the maximum passenger fare at 5 cents is void because the traffic in question is interstate traffic, the fares and charges for which, it is said, the municipal assembly of St. Louis has no power to prescribe. The city's rejoinder is that the terminal company is not a railroad within the meaning of the Act to regulate commerce, but only a street railway, and that under the decision of the Supreme Court of the United States in Omaha Street Railway vs. I. C. C., 230 U. S., 324, this commission has no jurisdiction over the terminal company, and no power to regulate its fares and charges.

"The respondents have through rate agreements with the Missouri Pacific-Iron Mountain system, the Wabash Railway, the Chicago & Eastern Illinois Railroad, and with a number of other steam railroads. The terminal company makes reports to this commission as a common carrier engaged in interstate commerce, and it is shown in tariffs filed with this commission as participating with various steam railroads in the establishment of through interstate routes and joint rates. That interstate traffic was contemplated when the franchise was granted clearly appears in the third section of the ordinance, which provides that the terminal company's lines 'shall be connected and operated in connection with the said interurban companies.' The fourth section of the ordinance grants to the terminal company the right 'to operate Pullman or sleeping cars.' Such cars are regularly operated, trains sometimes containing as many as five cars in all. The terminal company owns no freight cars, its freight equipment being supplied by its connections. It is interesting to observe that the city of St. Louis, while contending that the terminal company is merely a street railway, and not a common carrier by railroad subject to the jurisdiction of the commission, earnestly insists that respondents' facilities are well adapted to the transportation of freight and that it should endeavor to recoup its losses rather by developing its freight traffic than by increasing its passenger fares.

"The protestants rely principally on Omaha Street Railway vs. I. C. C., supra, where the Supreme Court of the United States discussed the meaning of the word 'railroad' as used in the Act to regulate commerce.

"The facts previously detailed clearly show that the terminal company is a 'railroad,' as that word has been construed by the highest tribunal in the very case relied upon by the protestants. It may be noted also that the Omaha & Council Bluffs Railway was incorporated as a street railroad, with no right of eminent domain and no authority to haul freight. The terminal company, on the other hand, was incorporated under the general railroad law of the State of Missouri, and enjoys and has exercised the right of eminent domain. It is clear that this commission has jurisdiction over the terminal company, with authority under the act to regulate its fares and charges.

"Nor can we agree with the contention made by the city of St. Louis that the fare of 5 cents per passenger is conclusively presumed to be reasonable because it was fixed as a maximum fare in the municipal ordinance and accepted by the terminal company as one of the conditions of the franchise grant. However indisputable may be the right of a city to grant or withhold from quasi public corporations the use of its highways, it cannot indirectly control or regulate interstate commerce by attaching conditions to its franchises. The same conclusion must be reached if the municipal ordinance and the acceptance of its conditions by the terminal company be viewed as a contract between the city and the railway company. Not only has a railway company a recognized right to earn a fair return on the value of the property which it devotes to the public service, but the interest of the public demands that carriers engaged in interstate commerce, if properly constructed and wisely managed, shall receive revenues which will enable them to keep their property and equipment in good repair and maintain their service at the highest possible point of efficiency. The interest of the public in this respect is paramount to the private rights of the parties, whether obtained by contract or otherwise, and in determining the reasonableness and the propriety of proposed rates or fares in investigations of this character the commission cannot consider its authority limited or its judgment controlled by the terms of private agreements which the carrier or carriers respondent may have made with other parties purporting to fix the measure of the rates in question. Admitting the correctness of the city's contention that a contract between a common carrier and a municipality differs in kind from a private contract between a carrier and shipper for the establishment of a preferential rate, it is nevertheless clear that both kinds of contracts must be disapproved to the extent that they seek by special agreement to require the maintenance of rates or fares which are unreasonable, discriminatory or unremunerative, or to the extent that they seek to lodge in other bodies the jurisdiction over interstate rates and fares which has been expressly conferred upon this commission by federal law.

"The respondents maintain that the charge of 5 cents is low for a service of this character, especially when it is considered that under the provisions of the municipal ordinance the terminal company is permitted to charge 3 cents for a foot passenger crossing the bridge one way and 10 cents for an equestrian. Comparisons of the proposed fare of 10 cents with the charges of other electric railways radiating from St. Louis show that the fare proposed is relatively low. A maximum passenger fare of 2 cents per mile is prescribed by statute within the State of Illinois, the law applying as well to electric railways as to steam railroads. If, therefore, respondents' lines were wholly within the State of Illinois, they would be permitted to charge a fare of 15 cents for their maximum haul of 7½ miles. In the present case they propose a fare of 10 cents. The evidence of record in this proceeding not only shows that the fare proposed is lower than others charged for a similar service in the vicinity of St. Louis, but it fails to reveal a single instance in which a fare as low as 5 cents is charged for a service fairly comparable with that afforded by the respondents.

INCREASE JUSTIFIED BY VALUATION

"Most of the evidence of record has been addressed to the financial condition of the respondent companies. The respondents assert and the protestants deny that the financial condition of the companies is poor and that the proposed fare is necessary to insure a reasonable net return on the value of the properties devoted to the service in question. Anticipating the presentation of this case before the commission and realizing the impossibility of arriving at a satisfactory determination of the original cost of their properties, the respondents employed two disinterested and competent engineers to appraise their reproduction value. When the appraisal was finished and before hearing was had in this proceeding, the complete inventory was placed at the disposal of the consulting engineer for the city of St. Louis. In spite of rigid examination by the city's engineer it has not been shown, or even seriously contended, that the valuation placed upon the properties by the appraisers is excessive.

"The appraisal value of the bridge property is $2,657,112, while the value of the property of the terminal company is placed at $3,647,264, making the total appraisal value of the properties of both companies (exclusive of intangibles) $6,304,377. The total par value of the outstanding securities of both companies amounts to $7,316,000, which exceeds by approximately $1,000,000 the appraised value of their properties. The respondents feel that the good-will of these companies and the value of their intangible property amply cover this difference. The total property investment account of the two companies, as shown by their books, is $7,791,379, which exceeds by approximately $1,487,000 the value of the property as estimated by the appraisers. This apparent discrepancy is at least partially accounted for by various expenditures for rights and facilities which were subsequently abandoned.

The operating figures seem clearly to show that the unfavorable financial condition of these companies is due at least in part to the inadequacy of the revenues from suburban operation. It is estimated that the proposed increases in passenger fares would add between $60,000 and $65,000 annually to the revenues of these companies.

"The city of St. Louis maintains that these figures are misleading, and that they cannot properly be regarded as establishing the respondents' need of additional passenger revenue. Its principal contention in this respect is that the respondents' facilities are as well adapted to the transportation of freight as to the transportation of passengers; that they should increase their revenues rather by developing their freight tonnage than by increasing their passenger fares; and that in allocating the values of the property and the revenues and expenses due recognition should be given to the adaptability of the facilities to the handling of freight.

"The respondents admit that a more or less extensive freight traffic was anticipated when these lines were constructed. In considering this question it should be borne in mind that electric railway companies which are so similar to ordinary street railways as the terminal company is said to be cannot be expected under ordinary circumstances to derive as much revenue from freight traffic as from passenger traffic. Just how much additional investment was made in these properties to accommodate the freight traffic does not clearly appear of record. It is shown, however, that in the year 1915 the revenue which the bridge and terminal companies received for the transportation of freight amounted to approximately 15 per cent of their total transportation revenues. The respondents are endeavoring to increase their freight tonnage, but it is unlikely that the freight revenue will equal the passenger revenue, at least in the near future. Under these circumstances it is clear that in determining whether or not respondents should receive additional revenues from their passenger service, the allocation of property values, expenses and revenues should be made on the basis of the freight traffic now handled, or which may reasonably be anticipated in the near future, and not on the assumption, contrary to fact, that the respondents are actually carrying as much freight as it is physically possible for them to accommodate. The allocation of 60.5 per cent of the total appraisal value of these properties to freight traffic is obviously subject to criticism, especially in view of the fact that the lines were constructed primarily for passenger service, and since only 15 per cent of transportation revenues are derived from freight. It may be observed in this connection that the municipal ordinance permits only the transportation of passengers, mail and express matter and that repondents have no right to use the city streets for the transportation of carload freight.

"There is no evidence of record indicating that the interurban service is profiting at the expense of the suburban service. On the contrary, it is shown that the terminal company receives liberal divisions of the through rates and fares between St. Louis and points beyond Granite City located on other lines of the Illinois Traction System.

VARIOUS FARES DISCUSSED

"The respondents apparently would have no objection to maintaining the present fare of 5 cents within the city of St. Louis and increasing to 10 cents the fare between St. Louis and all points on the east side of the river. It is clear from the whole record, however, that the imposition of an extra fare for the service in crossing the river would be regarded by the people of St. Louis as an 'arbitrary' charge, and it was principally for the purpose of avoiding their displeasure in this respect that the respondents finally proposed to maintain the same fare to and from both sides of the river. No point on the east side of the river has been suggested which could with greater propriety be chosen as a point of division between the 5-cent and 10-cent zones.

"The tariff under investigation provides in one item for the sale of fifty-two-ride non-transferable commutation tickets between St. Louis and Granite City and intermediate points for $3. A commuter using one of these tickets for fifty-two rides would pay at the rate of 5.76 cents for one single trip. These tickets, which are good only on suburban cars, and for thirty days from the date of sale, may be presented between the hours of 5 a. m. and 8 a. m. or between 4 p. m. and 6:30 p. m. on any day except Sunday. These hours were chosen because they are the periods of heaviest traffic. The commutation tickets will operate particularly to the advantage of the workmen who commute daily between St. Louis and the tri-cities, but they are open to any passenger who may desire to make use of them. During one representative week in January of this year 58.96 per cent of the passengers carried in the suburban service were commuters. Upon the whole record it seems that the commutation tickets will benefit a large number of persons without operating to the undue prejudice of others.

"The suspended tariff also provides for the sale of six-ride strip tickets for 50 cents, or 8.33 cents per trip. These tickets are transferable and good on any suburban cars at any time for transportation between St. Louis and Granite City. No objection has been made to this provision of the tariff, except that it results in increasing the fare.

"We find and conclude that respondents have established the propriety of all the proposed fares. The protestants may later bring to our attention any instances in which the commutation tickets or the limitations attached to their use result in undue prejudice, and with more complete evidence before us we shall then consider the advisability of modifying our findings as the circumstances may appear to require. It will be understood that nothing here said shall in any way prejudice the subsequent determination by the commission of the value of the respondents' properties or the return which they should properly yield."

The commission has announced that it will enter an order vacating the orders previously entered suspending the operation of the schedules in question.

DETROIT COMPANY WINS FARE CASE

U. S. Supreme Court Sustains Company's Rights on Fares in Annexed City Districts—Text of Majority Opinion Withheld for Revision

The United States Supreme Court handed down a decision on Dec. 11 sustaining the contention of the Detroit (Mich.) United Railway with respect to the right of the company to charge extra fares for transporting passengers beyond the old city limits into territory which has since been brought within the city as at present extended. The court also held the company need not sell reduced rate "working men's hour" tickets in the annexed territory. The practical effect of the decision is to permit the company to charge a double fare on Jefferson Avenue, east of St. Jean Avenue, to the city limits at Alter Road; also to charge a double fare on Grand River Avenue west of the boulevard.

The controversy was carried to the United States Supreme Court by the railway on a writ of error, following decision by the Michigan Supreme Court in favor of the city. The decision of Dec. 11 by the United States Supreme Court was rendered for the majority of the court by Justice Pitney, who withheld the text for revision. The dissenting opinion was rendered by Justice Clark with the concurrence of Justice Brandeis, the text being made public. The majority of the court accepted the view presented by former Senator Elihu Root, who appeared on behalf of the railway when the case was argued on Oct. 20 last. The two dissenting justices take the view presented on behalf of Detroit by Circuit Judge P. J. M. Hally, former corporation counsel of Detroit, who argued that the writ of error should be dismissed and the Michigan Supreme Court decision affirmed.

The company's right to collect a double fare in the suburban territory is sustained by the majority of the court on the ground of the franchise granted the company by Grosse Pointe township, previous to the annexation of the territory to the city. It is held that the Legislature of the State of Michigan, by the annexation acts of 1905 and 1907, could not impair the company's contractual rights. The chief point made by the city attorneys before the Supreme Court, that the question involved was purely one of contractual relations and as such not subject to United States jurisdiction, is overruled.

The specific case decided is that of the city of Detroit vs. the Detroit United Railway, known as the Fairview case. The action was begun about 1907, as soon as it became apparent that the company would insist on its right to charge a double fare in the annexed territory. It was the conception of the city that the franchise granted by the city of Detroit in 1898, which required the company to give an 8-for-25-cent fare during workingmen's hours, required that these fares should be extended into new territory which might be annexed. Before the Supreme Court Judge Hally argued that the workingmen's ticket and the concession for extension of fares within the city limits constituted the specific and recognized price which the city received for permitting the company to continue to use its streets. The Michigan courts unanimously sustained the city contention with this regard, and the same view is taken in the dissenting opinion of Justices Clark and Brandeis.

CHEAP FARES BEGET CHEAP SERVICE

Fielder Sanders, street railway commissioner of Cleveland, Ohio, said on Dec. 8 that the service on Euclid Avenue would be increased by Christmas week. Cars of several routes are operated over part of the Euclid Avenue tracks, and on this account it is difficult to readjust the schedules in such a way as to give satisfaction. Mr. Sanders also said that additional cars would be placed on the Madison Avenue and Wade Park lines. The Cleveland *Leader* of Dec. 7 said:

"No one who has experienced the jams common at certain times of the day on some if not all of the lines could deny that conditions are worse than uncomfortable. Dignity, decency and health are disregarded as totally as is comfort.

"It is noteworthy that this condition has come about in a city where street railway service is absolutely dominated, prescribed and regulated by elective or appointive representatives of the voters, not by officers of 'soulless corporations,' or 'greedy special privilege' looking for big dividends. It is obvious that the people have the remedy in their hands and can apply it as expeditiously and extensively as they wish. It would seem that they should do so, if not in defense of their own comfort, health, self-respect, morals and the like, then in defense of the theory that the public is capable of managing its own affairs intelligently. Present conditions are the more discreditable in that they obtain in a department of public service in which Cleveland has specialized for years.

"It is also to be noted that the car crowding is not a new development. It did not begin last week or last month. It has been increasing through the years, as the city's population has been increasing. The reason why the public and its representatives, though possessing full power to act, have not provided increased traction service in proportion to increased population is perfectly obvious. For fifteen years, officials and voters alike have been encouraged to believe that the one great desideratum—to which all considerations of equipment, schedules, extensions and so on must give way—is not good service but 3-cent fares. Of course the service has its faults."

PENNSYLVANIA JITNEY CASES BEING SETTLED

Orders are being issued by the Public Service Commission of Pennsylvania disposing of jitney cases which are governed by the decisions handed down by Chairman Ainey of the commission in the Allegheny Valley Railway and Wilkes-Barre Railways' complaints, referred to in the ELECTRIC RAILWAY JOURNAL of Dec. 9, page 1222. In both series of complaints there were numerous instances wherein the conditions were the same and formal orders to the owners to cease operating and secure State certificates have been prepared. It is estimated that there are about 115 jitneys in the Wilkes-Barre district controlled by the Parsons case, in which a certificate was ordered procured as a requisite to operation notwithstanding requirement of a city license will control. In the western cases probably a score will be affected.

The decisions rendered by the commission in jitney cases are being applied to complaints now on the dockets and where new angles arise hearings will be held. With exception of some administrative rulings it is probable that no additional opinions will be rendered on the cases in hand.

It was announced on Dec. 11 that the commission has declined the applications for the 250 jitneys for certificates of public convenience, claiming that there is adequate trolley service.

HEARING ON BOSTON TRANSFERS

H. B. Potter, assistant to the president, appeared before the Public Service Commission of Massachusetts, Nov. 23, in support of a petition of the Boston Elevated Railway for a reduction of transfer facilities on various Summer Street lines in connection with the opening of the Dorchester tunnel from Washington Street to Dewey Square. Mr. Potter pointed out that through the abuse of paper transfer checks at Washington, Winter and Summer stations of the rapid transit system many passengers from residential districts made a round trip on a single fare between their homes and the most congested retail center in New England. It is proposed to issue transfers at South Station (under Dewey Square) between Dorchester tunnel trains and Atlantic Avenue, Dorchester Avenue and Summer Street extension cars, doing away with the local transfer facilities on Summer Street, which at present offer opportunities for abuse. It is planned to remove all surface-car traffic from Washington Street, from Essex to Franklin Streets, during the holiday season, and some of the diverted lines will connect with Atlantic Avenue trains at the Beach Street elevated station, where increased service will probably be inaugurated. The commission took the case under advisement.

Inaction on Seattle Jitneys.—The special committee of the City Council of Seattle, Wash., which was asked by the Council to submit a report on jitney regulation has done nothing on the proposition, according to recent announcements.

Plans Under Way for Portland Zone System for Jitneys.—Commissioner Daly of the department of public utilities of Portland, Ore., is at work outlining a "standard zone system" for taxicabs, as directed by the Council. The city will be divided into zones which must be adopted by all taxicabs and jitneys operating their cars on the zone basis.

Use of Elevated Lines Urged.—The city authorities of New York and the officers of the Interborough Rapid Transit Company, New York, N. Y., are urging the city travelers to ride on the elevated lines instead of in the subway, and if they must use the subway to take the end cars instead of the middle ones, pointing out that the adoption of these reforms will not necessarily make those who adopt them late for the office.

"A Safe Rule."—The Beaver Valley Traction Company, New Brighton, Pa., under the direction of W. H. Boyce, superintendent, who has evolved many practicable safety first ideas, is now distributing 1-ft. rules with the usual inch divisions under which is the legend: "A Safe Rule—Stop, Look and Listen Before You Cross a Street." On the reverse side of the rule over the name of the company is the legend: "Remember we seek your co-operation to prevent accidents.

Special Interurban Service for Shoppers.—The Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, on Dec. 9, put on "shoppers' express" cars for the convenience of persons who must go to one of the towns on its lines to do their shopping. These special cars run every two hours in both directions on the lines between Youngstown and Warren, and Youngstown and New Castle, Pa. They will be operated every week day until Christmas. The cars stop only at the principal stops. Dashboard signs are used to designate the stops that are made.

Wisconsin Troops Transported on Electric Line. — The Chicago, Milwaukee & North Shore Railway, Highwood, Ill., of which Britton I. Budd is president, secured a contract in competition with the steam railroads and transported approximately 800 soldiers and their equipment from Fort Sheridan, Ill., to Milwaukee, Wis., a distance of 60 miles, on Dec. 14. The movement was made necessary by the mustering out of service of the Wisconsin National Guard at Fort Sheridan. The contracts was made jointly with the Chicago, Milwaukee & St. Paul Railway, which took the troops at Milwaukee, and carried them to some eleven points over the State.

Heating Equipment Installed in Seattle.—In accordance with an order issued by the Public Service Commission, the Puget Sound Traction, Light & Power Company, Seattle, Wash., has completed the installation of heating equipment in the cars operating on the Alki, Ballard Beach and Fauntleroy Park line. Thirty-eight cars in all have been improved in this manner. The order of the commission called for six heaters in each single truck car and ten in each double truck car, to be installed by Dec. 1. The company is operating in Seattle eighty-five cars equipped with heaters. The commission's order also calls for installation of sashes and glass on open cars, in order that open cars could be operated as closed vehicles. This has also been done.

Free Ride Agreement Invalid.—Former Senator and Mrs. Mitchell B. Perkins of Riverton, N. J., and their family of five children are denied free transportation for life over the lines of the Public Service Corporation between Trenton and Riverton in an opinion filed in the Court of Chancery by Vice-Chancellor Backes. The family received this privilege from the company which the Public Service Corporation succeeded, the grant being made in exchange for a right-of-way for the electric railway over lands owned by Mr. Perkins, in Beverly Township, Burlington County. Perkins was the promoter of the original trolley line from Palmyra to Trenton. The opinion of the Vice-Chancellor says that to sustain the contract would open the doors wide to the very evils the public utility statute was intended to suppress and would make it impossible for the commission to regulate and fix rates.

Inquiry Into Brooklyn Surface Service.—On motion of Commissioner Travis H. Whitney, the Public Service Commission for the First District of New York, set Dec. 11 as the time for a hearing at which the commission will take testimony and consider the advisability of issuing a general order covering service to be provided by the Brooklyn Rapid Transit Company on all of its surface lines. Commissioner Whitney in presenting the motion for calling the hearing stated that the commission may now act definitely in regard to service order matters inasmuch as the Court of Appeals has recently outlined the powers of the commission as regards mandamus proceedings. He pointed out also that certain changes in traffic conditions in Brooklyn arising from the adjustments following the opening of new rapid transit lines were such that the disposition and use of equipment could better be determined now than ever before.

Preparing for Billy Sunday in Buffalo.—The International Railway, Buffalo, N. Y., is preparing to handle the crowds which will attend the Billy Sunday meetings in Buffalo in February and March. After conferences with E. G. Connette, president of the International Railway, and N. H. Brown, general superintendent of the company, the campaign committee has decided to construct the tabernacle on the grounds of the Buffalo Baseball Park in East Ferry Street. The park is reached by six local car lines and the Buffalo & Lockport, Buffalo & Rochester and the Buffalo & Tonawanda Interurban lines run within a short block of the grounds. The East and West Utica car lines will be connected as a through cross-town route. The close proximity of the Cold Springs carhouse also helps to make the site an ideal location for the big tabernacle. Mr. Brown says the company will rebuild twenty of its old style cars and that other equipment will be secured to handle the increased traffic. The company is now employing about 250 more trainmen than it did a year ago.

Jitney Matter Before Vancouver Council.—W. G. Murrin, assistant general manager of the British Columbia Electric Railway, addressed the City Council of Vancouver, B. C., on Nov. 20 in regard to the street railway and the jitney as economic factors in the community. The Council asked the company to send a representative to the meeting. Mr. Murrin said that older and more settled communities in the East had already expressed themselves on the question and that where a capable and impartial body had directed its attention to the question there had been little doubt as to the result of the deliberations. In this connection he referred to the decision of the Public Service Commission for the Second District of New York in the famous Rochester case. He referred to the obligations which the railway was called upon to meet by the city as compared with the almost lack of responsibility of the jitneys, and in conclusion said that the city should either put the jitneys on the same operating basis as the railway or readjust the obligations of the company so they would equal those of the jitney.

Personal Mention

R. H. Merry has been elected secretary of the Mexico (Mex.) Tramways, Mexican Light & Power Company and Mexican Electric Light Company to succeed U. de B. Daly, resigned.

J. G. Swain, formerly general superintendent of power and shops of the Northern Ohio Traction & Light Company, Akron, Ohio, has resigned to become general superintendent of the rim plant of the Firestone Tire & Rubber Company at Akron, Ohio.

James Blaine Walker, secretary of the Public Service Commission for the First District of New York, will also serve hereafter as the secretary of the National Association of Railway Commissioners, a place made vacant by the death of William H. Connolly.

Robert C. Brown, a vice-president of the Mexico (Mex.) Tramways, Mexican Light & Power Company and Mexican Electric Light Company and formerly managing director of the Mexico Tramways, has been elected president of these companies to succeed the late F. S. Pearson.

Lafayette G. Rudd, who for several years has been superintendent of the East Lynne and Saybrook divisions of the Shore Line Electric Railway, Norwich, Conn., has had his jurisdiction extended to cover the New London lines of the company. He succeeds Peter Ashe at New London.

Peter Ashe, an assistant superintendent of the Shore Line Electric Railway, Norwich, Conn., in charge of the New London lines, has resigned to go into business for himself. Mr. Ashe has been connected with the company and its predecessors for twenty-nine years. He entered the service as a car cleaner.

I. B. White has resigned as superintendent of the Alexandria (La.) Municipal Railway to go into the automobile business in Shreveport, La. Irving McGinnis, commissioner of streets and parks of the city, under whose supervision the street railway is operated, will run the road for the present in addition to his other work.

T. Norman Jones, chief engineer of the maintenance of way of the Virginia Railway & Power Company at Richmond, Va., has been appointed assistant general manager of the Virginia Railway & Power Company in charge of its properties in Norfolk, to succeed E. C. Hathaway, whose resignation is noted elsewhere in this column.

G. E. Goldthwait, formerly load dispatcher and assistant to the electrical engineer of the Pittsburgh (Pa.) Railways, has been appointed associate editor of the *Railway Electrical Engineer*. Mr. Goldthwait was also connected with Gibbs & Hill on construction work on the Norfolk & Western Railroad, and remained with the railroad as power director at the Bluestone power station until June, 1916. He has been with the Standard Steel Works since then.

James H. Griffin, one of the employees longest in the service of the Kansas City (Mo.) Railways and superintendent of various divisions, has been made chief instructor of the company. He has three assistants at the school, and one man to go with the students on the cars after they have been assigned trips. There are also instructors at each carhouse and traveling instructors who follow up the new men and watch for opportunities to make suggestions to them.

Philip J. Kealy, president of the Kansas City (Mo.) Railways, has again been elected colonel of the Third Regiment, Missouri National Guard. Colonel Kealy was elected to this position a year ago, but when the regiment was mustered into the federal service he was rejected on physical examination. He had, however, got the regiment up to acceptable proportions, and had managed its movement to Nevada, Mo., before the rejection came. It is now planned to make the Third a cavalry regiment.

E. C. Hathaway, assistant general manager of the Virginia Railway & Power Company, Richmond, Va., in charge of the properties of that company at Norfolk, Va., has resigned, effective on Jan. 1, to devote all of his time to his private interests, among which is the Railway Audit & Inspection Company, Philadelphia, Pa., of which he is president. Mr. Hathaway has been in charge of the public utility properties in Norfolk for fourteen years and was connected with them in an advisory capacity for two years prior to that time.

Harry A. Bullock, secretary of the New York Municipal Railway Corporation and in general charge of the welfare work of the Brooklyn (N. Y.) Rapid Transit Company, was interviewed by Marguerite Mooers Marshall for the New York *Evening World* of Nov. 24 on corporation welfare work and labor. Miss Marshall quoted Mr. Bullock on labor as follows: "The key to the solution of the labor problem is simply a close personal understanding between the heads of any industry and its workers. Then any question that may arise may be settled in a frank man-to-man discussion, without the interference of outside forces. Then we can have promotions from the ranks only, and interested, permanent employees."

William S. Murray will on Dec. 31 terminate his connection with the New York, New Haven & Hartford Railroad, New Haven, Conn., as consulting engineer. Mr. Murray has been in the service of the company since April, 1905, in charge of electrical engineering, construction and operation with the title of electrical and consulting engineer. His recommendation of the alternating current single-phase system for the type of electrification to be applied to the New Haven was adopted and the electrical equipment was installed under his immediate charge. The severance of Mr. Murray's connection with the company is the outcome of differences between him and President Howard Elliott of the company regarding the basis upon which he re-entered the road's service in 1914 to devote a portion of his time to the company as a departmental officer but still retained his membership in the firm of McHenry & Murray, engineers, New Haven.

A. H. STANLEY

Sir Albert H. Stanley, managing director of the London Underground Electric Railways, London United Tramways, Ltd., Metropolitan District Railway, and the London General Omnibus Company, Ltd., London, England, who is well known in this country, has been named as president of the Board of Trade in the new English Ministry under David Lloyd George, Premier, and the head of the English war council. The usual custom of giving up their other positions will be followed by the men of the new government, and Sir Albert, it was announced by cable from London on Dec. 12, had resigned the directorships which he held in the London railways, and would sever all his connections with the companies until such time as he relinquished his post as president of the board. Sir Albert was knighted by King George on June 21, 1914, in recognition of distinguished public service. He was born in England about forty-two years ago, and began his career with the Detroit (Mich.) City Railway in the horsecar days. In 1902 he became connected with the Public Service Corporation of New Jersey as assistant general manager of the railway department. In the following year he was appointed manager of that department. In January, 1907, he assumed the duties of general manager of the corporation, but resigned soon thereafter to become general manager of the Underground Electric Railways of London. His appointment to the Board of Trade is further public recognition of the unusual abilities which he has displayed in his management of the London railways and of the success which has attended his efforts in this and other undertakings with which he has been identified.

OREN A. SMALL

Oren A. Small, auditor of the Benton Harbor of St. Joe Railway & Light Company, Benton Harbor, Mich., was elected president of the Central Electric Railway Accountants' Association at the meeting of the association in Cincinnati, Ohio, on Dec. 8 and 9. Mr. Small was born in Wabash, Ind., and learned the trade of a flour-miller under his father. In 1902, he entered the employ of the Big Four Railroad Company at Benton Harbor, Mich. After several years in steam railroad work he entered the office of the Baker-Vawter Company, printers and manufacturers of office systems. In 1907, he entered the office of the Benton Harbor & St. Joe Railroad & Light Company as bookkeeper. Two years ago he was promoted to the position of auditor of that company. Mr. Small secured his education in accounting at the Eastman National Business College at Poughkeepsie, N. Y. He has been an active and tireless worker on the executive committee and on the standing committee on freight and passenger accounts of the Central Electric Railway Accountant's Association.

S. L. Tone, vice-president of the Pittsburgh (Pa.) Railways, the Beaver Valley Traction Company, the Pittsburgh & Beaver Street Railway and the Duquesne Light Company, Pittsburgh, has been elected president of the Pittsburgh Railways to succeed J. D. Callery, as noted briefly in the ELECTRIC RAILWAY JOURNAL for Dec. 9. Mr. Tone was graduated from Rensselaer Polytechnic Institute, Troy, N. Y., and has served the Pittsburgh Railways and its constituents continuously for about twenty-five years, except for the short term of his service as a member of the Pennsylvania Public Service Commission, to which he was appointed in 1913 by Governor Tener. The Pittsburgh Railways and the Duquesne Light Company are controlled by the same interests and the railway is operated with power purchased from the light company. The Pittsburgh Railways controls all the principal lines in Pittsburgh, Allegheny and adjoining towns. In the railway system are included 604 miles of line.

JAMES L. ADAMS

James L. Adams has been appointed superintendent of transportation of the Denver (Col.) Tramway to succeed William N. Casey. Mr. Adams entered the service of the Denver Tramway in 1890 as an office boy and was advanced through a number of positions in the auditor's office and transportation department until he was made division superintendent of the East Division. This position he held one year and returned to the auditor's office as general timekeeper for the entire system. In 1900 he left the auditor's office to assume the position of division superintendent of the West Division and was transferred after one year to the position of superintendent of the East Division, and then to superintendent of the North Division until April 1, 1915, when the two divisions were combined and he was made superintendent over both. He served in this capacity until Aug. 15, 1915, when he resigned to become vice-president and general manager of the Crown Hill Cemetery Association and of the Denver & Crown Hill Railway. He returned to the Denver Tramway on Dec. 1 as superintendent of transportation.

OBITUARY

Sir George White, Bt., of Bristol, England, is dead. Sir George was interested in many British railway and industrial projects. He was perhaps most closely associated with the Bristol Tramways & Carriage Company, of which he was in succession secretary, managing director and chairman.

W. F. Pascoe, promoter and builder of electric railways in Cumberland County, Pa., died suddenly in Carlisle on Dec. 14. Mr. Pascoe was for several years superintendent of the Carlisle & Mount Holly Railway and built the line between Carlisle and Newville. Recently he has been in business at Easton, Pa., where he made his home with his daughter. He was in Carlisle on a visit when he died. Mr. Pascoe was also interested in theatrical enterprises. He was fifty-nine years old and is survived by his widow and six children.

George S. Haley, president of the General Engineering & Management Corporation, New York, N. Y., died on Dec. 3 from injuries received in a street accident. Mr. Haley was born in Manchester, N. H., and was graduated from the University of Iowa. In 1902 he became manager of the City Electric Company, Rutland, Vt., and when the Rutland Light & Power Company was formed in 1908 Mr. Haley was appointed general manager of the company. In 1912 he became vice-president and general manager of the Texas Power & Light Company with headquarters at Dallas. He resigned that position in June, 1916, to become president of the General Engineering & Management Corporation.

William H. Connolly, secretary of the National Association of Railway Commissioners and chief clerk of the division of valuation of the Interstate Commerce Commission, died at his home at Bradley Hills, Md., on Dec. 5. Mr. Connolly was born in Lindsey, Ont., on Dec. 10, 1867. He came to the United States with his parents and settled in North Dakota. He was appointed a clerk to the commission in 1890 and was promoted until July 1, 1905, when he was made chief clerk. He remained in that position until the valuation division was organized, when he was transferred to that branch of the work and organized the clerical staff of that part of the commission. Mr. Connolly is survived by his widow and four children.

Frederic H. Reed, first vice-president of the J. G. White & Company, New York, N. Y., died in New York on Dec. 9. Mr. Reed was born in Stamford, Conn., on Aug. 22, 1865, and attended the Stamford High School. From 1881 to 1883 he worked as a draftsman and in 1884 he became first assistant engineer on the construction of the Tenth Avenue Cable Railway in New York City. In 1885 Mr. Reed left the railway company to accept the position of chief engineer of the Daft Electric Company, with which he remained five years. While with that company he designed and installed early electric railways in Ithaca, N. Y., Camden, N. J., Asbury Park, N. J., and elsewhere. Later, for some time, he practised as consulting engineer in New York as a member of the firm of Reed & McKibben, but in 1899 joined J. G. White & Company as secretary. Later he was elected treasurer and then first vice-president and served as director in many light and railway companies in this country and abroad.

Capt. Joseph T. Jones, president of the Niagara Gorge Railway, Niagara Falls, N. Y., died at his home in Buffalo on Dec. 7, after an illness of several years. Captain Jones was born in Philadelphia on June 11, 1842. He enlisted in the Federal Army at the outbreak of the Civil War and was mustered out of service as captain, by which title he was generally known. After his discharge, Captain Jones started his business career in the Pennsylvania oil fields. Later he engaged in manufacturing in Buffalo and Niagara Falls. He also promoted the construction of the Gulf & Ship Island Railroad and at the time of his death he was president of that company and of the Gulfport & Mississippi Coast Traction Company. Captain Jones always took an active interest in Niagara Falls, and he conceived the idea of an electric railway along the American side of the lower gorge. This road, the Niagara Gorge Railway, known as the Great Gorge Route, has become famous throughout the world. Captain Jones is survived by his widow and one daughter. An only son, Joseph Albert Jones, who managed the properties in Gulfport, Miss., died six years ago.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Atlanta & Anderson Electric Railway, Atlanta, Ga.—A charter has been granted to the Atlanta & Anderson Electric Railway to construct a line from Atlanta to Anderson, S. C., about 140 miles. J. L. Murphy, Atlanta, is interested. [Nov. 11, '16.]

Union Traction Company, Coffeyville, Kan.—This company has filed a charter in Oklahoma and has been granted a permit to do business in this State. Headquarters in Oklahoma will be maintained at Oklahoma City.

FRANCHISES

Caldwell, Idaho.—The Boise Valley Traction Company has received a franchise from the City Council of Caldwell to construct a line along Cleveland Boulevard.

Averyville, Ill.—The Peoria & Chillicothe Electric Railway has received a forty-eight-year franchise from the Village Council to construct a line in Averyville. [Nov. 11, '16.]

Commerce, Mo.—The Oklahoma & Interstate Railway has asked the City Council for a franchise to construct a line in Commerce. John R. Rose, Oklahoma City, Okla., president. [Nov. 25, '16.]

Lima, Ohio.—The Ohio Electric Railway has received a franchise from the City Council of Lima to construct an extension of its tracks on East Grand Avenue to the Cincinnati, Hamilton & Dayton Railway.

Berea, Ohio.—In compliance with the wishes of citizens, as expressed in petitions, a special committee of the City Council of Berea has informed the Cleveland, Southwestern & Columbus Railway that it will be permitted to use its tracks through the town after Dec. 15, when its franchise expires, at a rental of $200 per month, provided it will pay half of the alleged damage to pipes from electrolysis which the town claims. The Council will act upon the matter at once if the company signifies its acceptance of the proposition. The City Council of Elyria has granted the Cleveland, Southwestern & Columbus Railway a twenty-five-year franchise in Elyria over the Mayor's veto.

Elyria, Ohio.—The Lake Shore Electric Railway has asked the Council for a renewal of its franchise in Elyria.

TRACK AND ROADWAY

Edmonton, Alta.—The Edmonton Hydro-Electric Power Company will begin work immediately on the construction of the proposed radial line.

British Columbia Electric Railway, Vancouver, B. C.—The Board of Trade of New Westminster, B. C., is negotiating with the British Columbia Electric Railway with a view to securing assistance in the construction of an industrial spur on Lulu Island. A. C. Eddy, engineer of the company, informed the board that it would cost about $65,000 to construct the tracks as outlined, this amount providing for 3 miles of trackage, 1½ miles on either side and paralleling the shore. A special committee headed by A. W. Gray has been appointed to interview officials of the British Columbia Electric Railway and ascertain what help, if any, may be secured in the construction of the proposed tracks.

Capital Traction Company, Washington, D. C.—Extension of the lines of the Capital Traction Company to afford transportation facilities to government buildings now built and being constructed south of Pennsylvania Avenue and west of Seventeeth Street was recently ordered by the Public Utilities Commission. The order authorizes the company to install necessary additional special work at Fifteenth Street and New York Avenue, so that Fourteenth Street cars may run west on Pennsylvania Avenue from that point, and the construction of a single track line in Nineteenth Street between Pennsylvania Avenue and Virginia Avenue, a single track line on Virginia Avenue between Eighteenth and Nineteenth Streets, and a single track line in Eighteenth Street between Virginia Avenue and F Street. The order provides that the company shall complete the extension authorized and commence operating cars over the new routes not later than Oct. 1, 1917. J. H. Hanna, vice-president of the company, said an order would be placed for materials at once and the work hurried through to completion. The company estimates the improvements will cost approximately $100,000.

***Atlanta, Ga.**—It is reported that bids are being asked by George O. Vanderbilt, Princeton, N. J., for the construction of 50 miles of railway in Georgia.

Southern Illinois Light & Power Company, Hillsboro, Ill.—Work will soon be begun by this company on the extension of its Taylor Springs line to the American Zinc Company's smelter, about ½ mile.

Illinois Traction System, Peoria, Ill.—This company has suspended business at Ridge Farm. Cars will operate only to the north edge of the village, and no freight shipments will be accepted into and out of that point.

Peoria (Ill.) Railway.—This company has been granted permission by the village of Peoria Heights to again operate cars on its Galena Road line through that village. The permission was granted following an order by the Council to the effect that the franchise was revoked and that the tracks must be removed. The village did not restore the franchise, but has given permission for the cars to be again operated.

Arkansas Valley Interurban Railway, Wichita, Kan.—It is reported that work will be begun in the spring by the Arkansas Valley Interurban Railway on the construction of three extensions: from Hutchinson to Kinsley and Great Bend, and from Newton to Salina. Equipment for these extensions is being purchased.

Hagerstown & Frederick Railway, Frederick, Md.—This company is considering an extension of its line at Hagerstown.

Bay State Street Railway, Boston, Mass.—The Public Service Commission has authorized the Bay State Street Railway to issue $2,000,000 coupon notes bearing interest at 6 per cent to pay for reconstruction of track, equipment and betterments.

***Lawrence, Mass.**—Sealed proposals for the furnishing of all material and labor for the construction of approximately 1500 lin. ft. of double track on the Central Bridge across the Merrimac River in Lawrence, will be received by the Lawrence Bridge Commission at the offices of John J. Donovan, rooms 507-508 Bay State Building, Lawrence, until Dec. 20. Detailed plans and specifications may be obtained at the office of B. H. Davis, consulting engineer, Whitehall Building, No. 17 Battery Place, New York City, upon the deposit of $5. A certified check for the sum of $1,000, payable to the city of Lawrence, must accompany each proposal.

Duluth (Minn.) Street Railway.—It is reported that this company plans to extend its line from Duluth to Proctor.

Trenton & Mercer County Traction Corporation, Trenton, N. J.—This company has agreed to contribute $10,000 toward the proposed new $100,000 tunnel to take the place of the grade crossing over the Philadelphia & Reading Railway tracks at Trenton Junction. At the present time the trolley tracks run only as far as the railroad. The tunnel will be 14 ft. high and 50 ft. wide.

New York, N. Y.—The Public Service Commission for the First District of New York has awarded a contract to the H. C. Stowe Construction Company, Brooklyn, N. Y., for building thirteen signal towers on the new elevated structures which are being built to extend the Manhattan subways into the Bronx and Queens Boroughs. The work is to be completed within four months, and the price for the whole is $110,651.

Northern Ohio Traction & Light Company, Akron, Ohio.—In order to complete the double track on the section between Cleveland and Akron, the Northern Ohio Traction & Light Company has made application to the Public Utilities Commission for permission to increase its capital stock by $1,000,000.

Cleveland & Sharon Rapid Transit Company, Cleveland, Ohio.—This company has applied to the Ohio Public Utilities Commission for permission to issue $100,000 capital stock and $200,000 of first mortgage 6 per cent bonds for the purpose of constructing a line between Middlefield and Lockwood. The right-of-way for the entire line between Cleveland and Sharon was secured some years ago, and then the matter was allowed to lie dormant. The section of the road which the company now proposes to build is through a rich farming country, and it is said that it will ultimately be completed as first planned. C. A. Black, Cleveland, president. [Feb. 26, '16.]

Springfield Terminal Railway & Power Company, Springfield, Ohio.—This company has been organized to succeed the Springfield, Troy & Piqua Railway.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.—This company contemplates the installation of automatic block signals on 12 miles of single track and 3 miles of double track between Youngstown, Ohio, and Sharon, Pa.

Mahoning Valley Railway, Youngstown, Ohio.—This company's line, extending south from Warren to the Trumbull steel mill, will be extended to Youngstown.

Youngstown & Suburban Railway, Youngstown, Ohio.—Plans are being prepared by this company for the construction of a double track to extend from South Side Park to Kyles Corners.

Perkiomen Valley Traction Company, Collegeville, Pa.—Construction has been begun by this company on a line between Collegeville and Schwenkville, paralleling the Perkiomen branch of the Philadelphia & Reading Railway. James L. Wolcott, Dover, Del., president. [Oct. 28, '16.]

Butler & Grove City Railway, Grove City, Pa.—This company reports that it has constructed about 5 miles of its proposed line between Grove City and Slippery Rock and will complete the line during 1917. The line will be about 9 miles long when completed.

Johnstown-Somerset Traction Company, Johnstown, Pa.—Negotiations have been completed by which a syndicate of Johnstown men, numbering more than a score, will take over the remainder of the work to be done in the completion of the Johnstown & Somerset Traction Company's line between Johnstown and Boswell. About $250,000 will be invested. Work on the line began almost two years ago, and has been held up at different times. A considerable amount of the grading between Johnstown and Boswell has been done. Probably one-half the work on the Windber branch, between Kelso Station and Boswell, has been completed. This includes a large amount of heavy grading, deep cuts and heavy fills. It is believed that the line from Kelso to Boswell will be completed in six months. [July 22, '16.]

Slate Belt Electric Street Railway, Pen Argyl, Pa.—A report from the Slate Belt Electric Street Railway states that the company expects to construct a new line between Wind Gap and Stroudsburg, 15 miles, during 1917.

Charleston-Isle of Palms Traction Company, Charleston, S. C.—This company reports that it will construct 1½ miles of new track during 1917.

***Columbia Railway & Navigation Company, Columbia, S. C.**—Surveys are being made by the Columbia Railway & Navigation Company for the construction of a railway which will probably be operated by electricity, from Columbia to Greenwood, about 70 miles. G. A. Guignard, Columbia, president.

Nashville Railway & Light Company, Nashville, Tenn.—The Nashville Railway & Light Company, the City Commission, and the Commercial Club of Nashville, are working together on a program for extension of the railway company's lines in the central part of the city, with the object of relieving existing congestion in the downtown section. Specifically it is proposed that Deaderick Street will be opened through to Capitol Boulevard and the railway company double-track along the boulevard to Church Street. Numerous meetings of committees and public meetings are being held, at which the subject is discussed.

Seattle & Rainier Valley Railway, Seattle, Wash.—Councilman Oliver T. Erickson of Seattle recently stated that as soon as an agreement is reached between the city of Seattle and the Seattle & Rainier Valley Railway, relative to certain changes and extensions proposed by the company, steps will be taken to acquire common user rights for the city for division "A" of the Seattle municipal line on Fourth Avenue, from Stewart Street to Jefferson Street. The agreement between the city and the Seattle & Rainier Valley Railway Company will relieve the company of some of the obligations of its franchise as to street paving and will also provide for a change at Times Square, where cars will be operated over a wye on Fourth Avenue, rather than on Stewart Street. Other provisions include construction of the main line on Dearborn Street, and the operation of cars over Fourth Avenue South, as far as Seattle Boulevard, and on Seattle Boulevard to the new tracks on Dearborn Street.

Portland, Vancouver & Northern Railway Company, Vancouver, Wash.—This company, which holds a franchise for the construction of a street railway line across the military reservation in Vancouver, Wash., states that it will construct and have the road in operation by June 1, 1917, providing property owners in the district most benefited will enter into bonus contracts with the company. Henry Crass, Vancouver, president. [Feb. 13, 15.]

Monongahela Valley Traction Company, Fairmont, W. Va.—An extension of this company's lines was authorized at a recent meeting of the board of directors. Surveys will be made at once of three routes, from Wolf Summit to Salem, from Bridgeport to Philippi and from Lumberport to Wallace. The line will be built during 1917.

SHOPS AND BUILDINGS

Chicago, North Shore & Milwaukee Railroad, Highwood, Ill.—This company plans the erection of a freight terminal at the corner of Broadway, Erie and Milwaukee Streets and the river, in Milwaukee. The structure will be 43 ft. x 112 ft., and the entire ground floor will be used as a freight terminal for the company.

Interborough Rapid Transit Company, New York, N. Y.—The Public Service Commission for the First District of New York has set Jan. 3, 1917, as the date for the receipt of bids for the construction of station finish on six of the seven stations on the underground portion of the Southern Boulevard and Westchester Avenue extension of the Lexington Avenue subway. The Third Avenue station is already under contract. The stations included in the present contract are Brook Avenue, Cypress Avenue, East 143d Street, East 149th Street, Longwood Avenue and Hunt's Point Road.

Northern Ohio Traction & Light Company, Akron, Ohio.—It is reported that this company plans to construct a modern carhouse and substation on the site of the carhouse recently destroyed by fire at Massillon.

Oklahoma (Okla.) Railway.—Work will be begun at once by the Oklahoma Railway on the construction of a new brick depot in Norman. The structure will cost about $7,000.

Northern Texas Traction Company, Fort Worth, Tex.—Main Arcade and several other buildings at Lake Como, a pleasure resort at the terminus of the Arlington Heights street-car line, established ten years ago by the Northern Texas Traction Company, were destroyed by fire on Dec. 1, causing a loss of more than $6,000.

POWER HOUSES AND SUBSTATIONS

Arkansas Valley Railway, Light & Power Company, Pueblo, Col.—Early next year the Arkansas Valley Railway, Light & Power Company will erect about 10 miles of 13,000-volt transmission line to serve several large irrigating projects in the Arkansas Valley.

Hagerstown & Frederick Railway, Frederick, Md.—This company plans to install a 5000-kw. generator, condensers, boilers, etc., in its power plant at Security.

INDUSTRIAL NEWS

Review of Trade and Market Conditions

Rolling Stock Purchases **Business Changes** **Trade Literature**

A. H. ENGLUND DISCUSSES SUPPLIES CONDITIONS

Fall Orders Twice Normal—Rail Bonds Show High Sale Value—Gear Case Deliveries Normal—Headlight Sales Increasing Rapidly

A. H. Englund of the Electric Service Supplies Company was asked by a representative of this department for his views on market conditions so far as they applied to the products of his company. His statements may be summarized as follows:

The manufacturer of electric railway supplies is now confronted with producing and marketing conditions which call for extreme caution in buying and selling. This part of the electric railway industry finds itself face to face with the highest prices and unsatisfactory deliveries of raw material and with a dearth of skilled labor such as never before was contemplated. While production is the big problem to-day and selling prices are consequently higher, nevertheless orders are being received in large totals. For example, in normal years the months of November and December are usually very quiet, but now orders are being booked during these months in amounts equaling the orders usually placed in the active spring buying season. This indicates that business is now being placed at a rate twice that of normal years.

As for the special lines manufactured and sold by the Electric Service Supplies Company, when taken as a group the business for the year is from 60 to 75 per cent above that of a normal year. "Protected" rail bond sale values for 1916 will be higher than ever before, but the actual number of bonds has been exceeded in previous years when new construction was heavier. Copper prices have forced the sale price of bonds so high that measured in money the year is larger than actual installment requirements would at first hand indicate.

EXCEPTIONAL ACTIVITY IN GEAR CASES

Gear-case sales have increased very materially as compared with those of 1915, but even so, this company has been able to make shipments on practically a normal basis. This has been due to the fact that orders for sheet steel placed well in advance of the congested market have furnished raw material in sufficient quantities and with such regularity that good deliveries have been made possible. This also applies to the sheet steel required for the manufacture of headlight cases. In the manufacture of Golden Glow searchlights, the problem of obtaining sheet brass has been difficult at times, but in general, ordinary material requirements have been fulfilled.

The Golden Glow headlight, which this company purchased about a year ago, has sold in a remarkably active way. The sales for 1916 will probably equal in number the total sales for this type of headlight in all previous years. Indications point toward a greatly increased sale among the electric railways for 1917. This is due to the fast recognition of the operating efficiency of the incandescent type of headlight, and the peculiar merit of the parabolic glass reflector used. Next year's prospects for sales of this headlight include the steam railways, which under a recent ruling of the Interstate Commerce Commission, will be called upon to improve their locomotive headlights. Our company is now at work developing a special high-powered Golden Glow unit that will meet all the government requirements.

The Electric Service Supplies Company, in looking toward expansion of the headlight business in the steam railway field, has recently purchased the turbo-generator business of the Darling-Henrici Manufacturing Company of Boston. Lewis A. Darling has joined the staff of the Electric Service Supplies Company as engineer of a new department which will manufacture, in Philadelphia, small turbo-generator units for locomotive headlights and the electric lighting of the locomotive cab and for special lighting on a limited scale wherever high-pressure steam is available.

NEXT YEAR'S BUSINESS PROSPECTS

The possibilities for business next year can hardly be stated without great speculation. Copper, now quoted above 35 cents spot cash for ingots and still going up, sounds the keynote for future prices of a great many electric railway essentials. It is doubtful whether the electric railways can continue to buy copper and copper products with the bare metal ranging between 35 and 40 cents. Money put into copper products might be classed as a perpetual investment, and roads can hardly afford to invest in more than the actual running necessities at the price which manufacturers, due to the cost of all raw material now quote.

Manufacturing difficulties to-day focus not only around the high prices of raw material but are embarrassingly involved because of the shortage of material at any price and the scarcity of skilled labor.

Malleable iron foundries refuse to contract on a long-period basis as formerly was done, and the manufacturer of electric railway-line materials and fittings calling for a multiplicity of small, light patterns can obtain malleable castings only at excessively high prices and with uncertain deliveries. On some shipments, in order to assist the customer out of extreme situations, the Electric Service Supplies Company has substituted cast brass and cast iron for malleable parts where service conditions and necessary strength would permit.

Because of the acquisition of the Golden Glow headlight and searchlight business and because of the general growth in sales of other lines, the Electric Service Supplies Company will shortly place contracts for a new wing to its Philadelphia factory. This will increase the floor space by about 75 per cent. The change will provide enlarged quarters for the gear case and headlight departments and also for the Garton-Daniels lightning arrester department. The latter department will shortly announce for sale a new type of lightning arrester for a.c. circuits.

ACTIVITIES IN CULVERT AND ARMCO IRON MANUFACTURE

Purchasers Favor Galvanized Material—Prices Have Been Stable—Armco Iron Used by Manufacturers for Various Purposes

According to B. G. Marshall, American Rolling Mill Company, Middletown, Ohio, the companies which manufacture Armco iron culverts report good business in their specialty. A year ago the spelter question was of great importance and caused some of this group of manufacturers to change the protective coating of their culverts from galvanizing to an asphaltic compound. Zinc for galvanizing has touched 27 cents per pound. It is now about 12½ cents and again it is possible to obtain deliveries on longer orders. This could not be done a year ago.

Thus, last year, the manufacturers investigated and determined upon the best available kind of asphaltic coating and methods for its application. Two or three companies are now supplying culverts with the special coating, but it is stated that galvanizing seems to be favored by the purchasers.

PRICES TO CONSUMERS HAVE BEEN STABLE

Culvert profits have been curtailed very greatly during the past year owing to the high prices of the constituent materials, but so far the manufacturers have treated the conditions as temporary and have raised prices to the consumers very little, if any.

The material used by the culvert manufacturers earlier referred to is known as Armco iron. It is the special product of the American Rolling Mill Company, Middletown, Ohio. During its last fiscal year this company, according to Mr. Marshall, made nearly 90,000 tons of Armco iron and thereby exceeded its production record for previous years. This form of iron is used by more than seventy-five stove and range manufacturers, principally on account of its rust resisting qualities, and because it is well adapted to enameling and welding processes. It is said to be almost free from included gases, and since gas blowholes are the cause of the largest number of culls which develop when enamel is baked on ordinary steel, the special iron is favored by manufacturers of enameled steel products. Among these are the makers of enameled steel signs, such as are used by electric railways.

Galvanized Armco iron is also used in a great variety of products where rust resistance is of first importance, as in culverts and tanks for water and oils, underground vaults, etc. In the ungalvanized state it is used as sheets and plates for passenger cars. A notable example of this use is the type of car built for the electrified division of the Erie Railroad.

ELECTRIC RAILWAY USES ARE VARIED

The Westinghouse Electric & Manufacturing Company uses large quantities of Armco iron in the manufacture of transformer cases, and W. N. Matthews & Brother, St. Louis, use it for the rods for their "Scrulix" guy anchors. Also, on account of its rust resisting quality, it has been a favored material in plate form for boiler plant stack construction, and in galvanized culvert form for condenser circulating water intakes. Probably the largest user of Armco iron culverts is the Pacific Electric Railway of Los Angeles.

A novel use is for third-rails and other electrical conductors. Mr. Marshall states that because of its purity and density this material has 50 per cent higher electrical conductivity than ordinary iron.

WESTINGHOUSE ELECTRIC WILL BUILD NEW PLANT AT ESSINGTON, PA.

Between $5,000,000 and $7,000,000 Will Be Spent to Provide Additional Manufacturing Facilities

The Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has made arrangements to build at once a large plant on the Delaware River at Essington, Pa.

According to a statement issued by Guy E. Tripp, chairman of the board of directors, the company's facilities are now taxed to capacity to manufacture its regular products, and in spite of the vigorous effort which has brought production to its present record output, it has been found impossible to keep pace with the growing demand so that much profitable business offered has had to be declined. Unfilled orders on hand for the regular products of the company, that is to say exclusive of rifle or shell contracts, amount to over $31,000,000, which is by far the largest amount the company has ever had on its books.

There are many factors contributing to this condition. Improvements in the large steam electric generating units have led to great increases in central station capacity near manufacturing centers, and have made profitable the sale of electric current at rates which have so stimulated consumption as to create an enormous demand for industrial motors. The coal shortage of the last six months has emphasized the comparative handicap under which the small steam plant suffers and can hardly fail to further accelerate the movement to substitute central station service for isolated plants. In railroading practically every class of heavy service is now performed successfully by electric power, and this field promises to be one of rapid expansion.

To provide additional manufacturing facilities needed there has been purchased on the Delaware River at Essington, Pa., just outside of Philadelphia, a tract of land having a deep water frontage and large enough to accommodate an ultimate factory development, several times as great as that of the East Pittsburgh works. It is planned to begin immediately the erection on this land of a new plant to cost between $5,000,000 and $7,000,000.

WHEEL AND AXLE STANDARDS ASSIST MANUFACTURE AND DELIVERY

Steel wheels and axles have been ordered and delivered in 1916 in large quantities, according to Mr. Robert Radford of the Standard Steel Works Company, Philadelphia, Pa. The electric railways, which have been regular customers, have been taken care of with wheels and axles even though it would have been far more profitable for the company to have used its raw material in other lines of manufacture. Mr. Radford also states that notwithstanding the extraordinarily high prices for steel, his company has not advanced the wheel and axle prices except when absolutely necessary to meet market conditions. He has received practically no complaint on account of unreasonable delays in delivery. It has been the policy in taking care of old customers of this company during the recent active months to keep them all fully informed of the trend of market conditions.

The Standard Steel Works Company some years ago settled upon a limited number of standard designs of wheels and axles. Special designs have not been sought for production. Adherence to this principle has made it possible to produce quality products more economically than if a great number of designs had been followed. Mr. Radford suggests that the electric railways should give active consideration to the anticipation of their 1917 requirements. The market fluctuates very rapidly and prospects for increases in price or restrictions in raw material are quite probable.

PULMOTOR NOW MANUFACTURED IN AMERICA

Pulmotors of the type manufactured by the Draeger-Oxygen Apparatus Company, Pittsburgh, Pa., are used by a number of the larger electric railway properties. These are designed for use in resuscitating persons who have been overcome by electric shock.

According to F. F. Morris, President of the Draeger-Oxygen Apparatus Company, pulmotors were formerly supplied very largely from Germany. The shipping restrictions and the delivery conditions since the war have necessitated the manufacturing of some of the parts in this country. Accordingly, the Draeger-Oxygen Apparatus Company has recently made satisfactory arrangements for the manufacture of pulmotors in this country and is now actively at work in catching up with its past orders. All parts are now made in this company's shop at Wilkinsburg, Pa.

LARGE MANUFACTURING COMPANIES ANNOUNCE BONUSES

In recognition of the fact that the purchasing power of the dollar to-day is considerably less than it was before the war in the matter of food and fuel, numbers of employers have been quick to respond to the needs of their employees.

According to the plan of the General Electric Company, which has just been announced, each employee receiving $2,500 per year or less will receive a monthly bonus of 10 per cent of his monthly salary. This is in addition to the bonus plan announced by the company last August whereby employees share semi-annually in the profits. The present plan will affect about 60,000 employees and will increase the company's payroll by about $500,000 a month or a total of $6,000,000 annually.

The bonus plan announced on Nov. 1 by the Westinghouse Electric & Manufacturing Company for East Pittsburgh, salaried men has been enlarged to cover all offices as of Dec. 1. The plan has been in effect with the workmen since the fall of 1915.

MERGER PLANNED AT PITTSBURGH, PA.

Westinghouse Air Brake Company and Union Switch & Signal Company Will Be Combined

The merger of two important companies engaged in the manufacture of railway supplies will be completed within a few weeks by the combination of the Westinghouse Air Brake Company, Wilmerding, Pa., and the Union Switch & Signal Company, Swissvale, Pa.

The directors of the two companies have unanimously approved a proposition to unite these two companies, and the matter will be submitted to stockholders of both companies for approval within a short time. It is proposed to increase the capital stock of the Air Brake Company from $20,000,000 to $30,000,000 and to exchange the shares at the rate of four shares of Air Brake for five shares of Union Switch preferred, and two shares of Air Brake for three shares of Union Switch common.

As both companies are controlled by practically the same interests, and are engaged in the same kind of business, the merger will reduce overhead expenses and will effect large economies. It is reported that a 20 per cent stock dividend will also be declared.

ROLLING STOCK

Scranton (Pa.) Railway is reported to be in the market for cars.

Denver (Col) Tramways are reported to be in the market for twenty-five cars.

Boston (Mass.) Elevated Railway is in the market for thirty-five steel subway cars.

Tri-City Railway, Davenport, Iowa, has ordered ten cars from the American Car Company.

City Railway, Dayton, Ohio, is reported to be in the market for a number of cars.

Alton, Granite & East St. Louis Railway, East St. Louis, Ill., recently had one of its cars destroyed by fire due to an overheated stove. None of the passengers was injured.

Interborough Rapid Transit Company, New York, N. Y., is reported to be considering the purchase of a large number of cars.

Brooklyn Rapid Transit System, Brooklyn, N. Y., has been instructed by the Public Service Commission to purchase 250 additional surface cars and to place them in operation by Feb. 1, 1918. The cars required by the Commission are of the center entrance type, with a seating capacity of fifty-eight passengers each.

Long Island Railroad, New York, N. Y., noted in the ELECTRIC RAILWAY JOURNAL as having ordered forty-five trail cars and fifteen coaches from the Pressed Steel Car Company, has specified the following details for this equipment:

	Motor Cars	Trailers
Seating capacity	72	80
Weight of car body	67,000 lb.	44,000 lb.
Bolster centers, length	39 ft. 9 in.	39 ft. 9 in.
Length of body	54 ft. 3¾ in.	54 ft. 9¾ in.
Length over vestibule	63 ft. 4¾ in.	63 ft. 4¾ in.
Width over sills	9 ft. 9¾ in.	9 ft. 9⅝ in.
Width over all	9 ft. 11½ in.	9 ft. 10¾ in.
Body	Steel	Metal
Interior trim	Steel	Steel
Headlining	Steel	Steel
Roof	Clerestory	Arch type
Underframe	Steel	Steel
Air brakes	Westinghouse	Westinghouse
Couplers	Sharon special	Sharon special
Window fixtures	O. M. Edwards	O. M. Edwards
Curtain material	Pantasote	Pantasote
Door operating mechanism	None	Pneumatic
Hand brakes	Ry. Standard	Ry. Standard
Heaters	Steam heat—Gold traps	None
Journal boxes	Ry. Standard	Ry. Standard
Paint	Valentine	Valentine
Sash fixtures	O. M. Edwards	O. M. Edwards
Seats	Heywood Bros. & Wakefield Walkover	Heywood Bros. & Wakefield Walkover
Seating material	Plush	Rattan
Springs	Union Spring & Mfg. Co.	Union Spring & Mfg. Co.
Step treads	Diamond Pressed Steel	Diamond Pressed Steel
Trucks	Ry. Standard	Ry. Standard
Varnish	Valentine	Valentine
Ventilators	Deck sash	Automatic Ventilator
Wheels	Rolled steel	Rolled steel

Detroit (Mich.) United Railways has ordered from the Standard Motor Truck Company fifty pair of its type 0-50 outside-hung motor double trucks and fifteen pair of M. C. B. steam railroad arch-bar trail trucks for delivery in April, 1917.

East St. Louis & Suburban Railway, East St. Louis, Mo., noted in the ELECTRIC RAILWAY JOURNAL of Dec. 2, 1915, as being in the market for forty-five car bodies, expects to order five new arch-roof interurban cars. The company will also rebuild five city cars.

International Railway, Buffalo, N. Y., noted in the ELECTRIC RAILWAY JOURNAL of Dec. 2, 1916, as reported to have purchased sixteen cars, has ordered twenty double-end center-entrance car bodies from the G. C. Kuhlman Car Company and twenty pair of Brill 27 M. C. B. trucks.

Detroit (Mich.) United Railway, noted in the ELECTRIC RAILWAY JOURNAL of Nov. 18, 1916, as being in the market for fifty trail cars, has ordered this equipment and fifty additional motor cars from the G. C. Kuhlman Car Company. This company has also purchased eight interurban cars from the Jewett Car Company.

Hodenpyl, Hardy & Company, New York, N. Y., has ordered twenty-five pair of type 0-50 motor trucks from the Standard Motor Truck Company, ten pair to be distributed in Akron, Ohio, and fifteen pair to be distributed in Grand Rapids, Mich. This company has also ordered from the Baldwin Locomotive Works five pair of W87-30 AA trucks for high-speed electric passenger service on the lines of the Michigan Railway Company.

TRADE NOTES

Walter E. Hinmon, sales manager of the Cooper Heater Company, Carlisle, Pa., has been elected a director of that company.

Economy Fuse & Manufacturing Company, Chicago, Ill., has opened a branch sales office in Seattle, at 936 Henry Building. W. E. Jones is district sales manager for the Pacific Northwest.

D. L. Sacks, who for the past five years has been associated with the St. Louis branch of H. W. Johns-Manville Company, has now taken charge of the advertising department of the Walter A. Zelnicker Supply Company.

H. M. Byllesby & Company, New York, N. Y., and Chicago, Ill, announce that illustrated literature bearing upon the intrinsic durability of public utility investments when the properties are operated by experienced specialists will be sent to inquirers upon request.

Ohio Brass Company, Mansfield, Ohio, announce that 200 Crouse-Hinds headlights are specified on 100 new Boston Elevated cars. These headlights are of the mirror-reflector gold glass type. High power incandescent lamps will be used with these headlights.

Railway Improvement Company, New York, N. Y., announces that its Rico anti-climbers have been specified on the ninety-five cars recently ordered from the St. Louis Car Company by Hodenpyl, Hardy & Company. They have also been specified by the Public Service Railway, Newark, N. J., for the 100 cars to be built during the early part of 1917 by that company.

Lord Manufacturing Company, New York, N. Y., has received the following orders: Fourteen Horne double-acting brakes for Japan from the E. G. Long Company; four differential brakes for Australia from G. S. Ackley; six screenless air cleaners from Westinghouse Air-Brake Company and five air rectifiers from the Rutland Railway, Light & Power Company.

Steel Car Company, Cleveland, Ohio, recently incorporated in Ohio, with a capital stock of $500,000, has purchased thirty acres of land east of Cleveland, where a plant will be erected. The company will manufacture steel cars, and will repair both steel and wood cars. Patrick Joyce, president of the Illinois Car & Manufacturing Company and of the Indiana Car Repair Company, is president of the new company. Several Cleveland men are also interested in it.

Bayonet Trolley Harp Company, Springfield, Ohio, reports through R. A. Garlough that the sales of this company will show an increase of 30 per cent this year as compared with the year 1915. Some difficulty at times has been experienced in obtaining springs and brass washers, but all deliveries have been made within reasonable time. The problem of obtaining malleable castings, which has embarrassed so many manufacturers, has not been a difficult one for this company because it is not located in a great industrial center and has been well supplied by a local foundry. Enough materials for manufacturing the Bayonet trolley harps and detachable pole clamps are now on hand to assure that there will be no embarrassment in the near future. The first detachable harp and pole clamp were sold twelve years ago to the Dayton, Springfield & Urbana Electric Railway, now a part of the Ohio Electric Railway. These are still in active use on an interurban express car. The latter company has more than 100 Bayonet harps in use, all limiteds being equipped with them.

W. R. Garton Company, Chicago, Ill., will on Jan. 1, 1917, change its name to the Electrical Material Company and move from its present quarters at 11-17 South Desplaines Street to 618 West Jackson Boulevard, having outgrown the present quarters. The company was organized in 1898, by William R. Garton, now of New York City, and Ray P. Lee, and specialized in street railway and electric mine supplies and equipment. Mr. Garton retired from the company in the fall of 1907, to enter the manufacturing field in the East, and Mr. Lee bought out his interest succeeding to the position of president and treasurer. A. F. Henderson, who has been associated with Mr. Garton and Mr. Lee since 1900, was made secretary at that time. In the organization of the new company, Mr. Lee will continue as president and Mr. Henderson as secretary. E. Lewis, with ten years' service for the company as sales representative in the Iowa district, will be vice-president and G. J. Traner will be treasurer. The latter has been auditor and credit manager for the Garton Company for about ten years. The new company will continue to represent the same well-known manufacturers as it has in the past, and will continue its sales work in the Central Western States of Minnesota, Iowa, Wisconsin, Illinois, Michigan and Indiana.

The Paducah Pole & Lumber Company, Paducah, Ky., has just completed arrangements with the A. B. Smith Lumber Company for 200,000,000 ft. of cypress stumpage for the manufacture of cypress crossarms. A new crossarm factory at Bondurant, Ky., has been completed, and equipped with saws, boring machines and other appliances in order to manufacture crossarms at the rate of 5000 10-ft. arms a day. John L. Fay, sales manager of the Paducah Company, has completed an analysis of the characteristics of different woods available for crossarm purposes. He says that cypress is recognized as one of the longest-lived woods in existence, and that its extraordinary natural strength is afforded largely because of its small capillary tubes, which give it a peculiar cellular, close-knit, fine-grained structure. This cellular structure and close-knit grain is well adapted to receive preservative treatment, since the size and form of the cells tend to retain the treatment and prevent the leaching which is common where the cellular structure is larger. Cypress has not been generally used for crossarms, it is said, because the demand upon it for general building work has been unlimited. This company proposes to put out 75 per cent or more of heartwood, as arrangements have been made to dispose of the surplus slabs. With the production of this type of crossarms possible, and the owning of large timber stumpage rights, the company expects to be a factor in the crossarm field.

ADVERTISING LITERATURE

Hemingray Glass Company, Covington, Ky., has issued catalog No. 28 on its standard glass insulators.

G. Drouve Company, Bridgeport, Conn., is distributing a pamphlet on its straight push sash operator.

New England Oil, Paint & Varnish Company, Boston, Mass., is distributing a pamphlet on pole paint.

Q. & C. Company, Chicago, Ill., has issued a bulletin on its Type 1M shop saw for either belt or motor drive.

Chicago (Ill.) Pneumatic Tool Company is distributing catalog No. 43 on its Rockford railway motor cars.

Holland Trolley Supply Company, Cleveland, Ohio, is distributing a pamphlet on its ball-bearing trolley bases.

Watson-Stillman Company, New York, N. Y., is distributing catalog No. 94 on its hydraulic valves and fittings.

General Bakelite Company, New York, N. Y., is distributing its new publication, "Bakelite on the Automobile."

Anglo-American Varnish Company, Newark, N. J., is distributing a pamphlet on its weathering enamels for semaphores.

Searchlight Company, Chicago, Ill., has issued a bulletin on its oxy-acetylene process for manufacturing and repair purposes.

National Lead & Oil Company, Pittsburgh, Pa., is distributing a booklet on "Why Highly Oxidized Red Lead Is Superior."

Hyatt Roller Bearing Company, Newark, N. J., is distributing bulletin No. 1100 on its flexible roller bearings for railway cars.

Railway Utility Company, Chicago, Ill., has issued a pamphlet on its utility thermometer control of electric railway car heaters.

Jeffrey Manufacturing Company, Columbus, Ohio, has issued bulletin No. 179 on its Jeffrey Randall graphite lubricating bearings.

Standard Corporation, Philadelphia, Pa., distributors of Lefax pamphlets, have moved to new quarters in the Sheridan Building.

Van Dorn Electric Tool Company, Cleveland, Ohio, has issued a pamphlet on its Universal electric drill for all drilling requirements.

Ohio Brass Company, Mansfield, Ohio, is distributing a pamphlet on its process of "gas-weld bonding" in paved streets, on open track, and on the elevated.

Railway Storage Battery Car Company, New York, N. Y., has issued an illustrated pamphlet on its self-propelled passenger cars equipped with the Edison non-acid storage batteries.

International High-Speed Steel Company, New York, N. Y., manufacturer of high-speed steel, tool and metal alloy steels, has issued an attractive booklet on the manufacture of its products.

Beaudry & Company, Inc., Boston, Mass., has just issued a sixteen-page booklet on its "Champion" and "Peerless" power hammers. Several pages are devoted to specifications and useful data on motor-driven power hammers.

Chicago Pneumatic Tool Company, Chicago, Ill., is distributing its bulletin 34-K on its class N-SO fuel oil engine-driven compressor. These compressors are furnished in two types, one stationary and the other with the tank mounted on wheels.

Manganese Track Society and the Manganese Steel Founders' Society, Chicago, Ill., have just issued booklet No. 6, giving rules and detailed design for laying out manganese steel rail-bound frogs which have been adopted by these societies as their recommended standard.

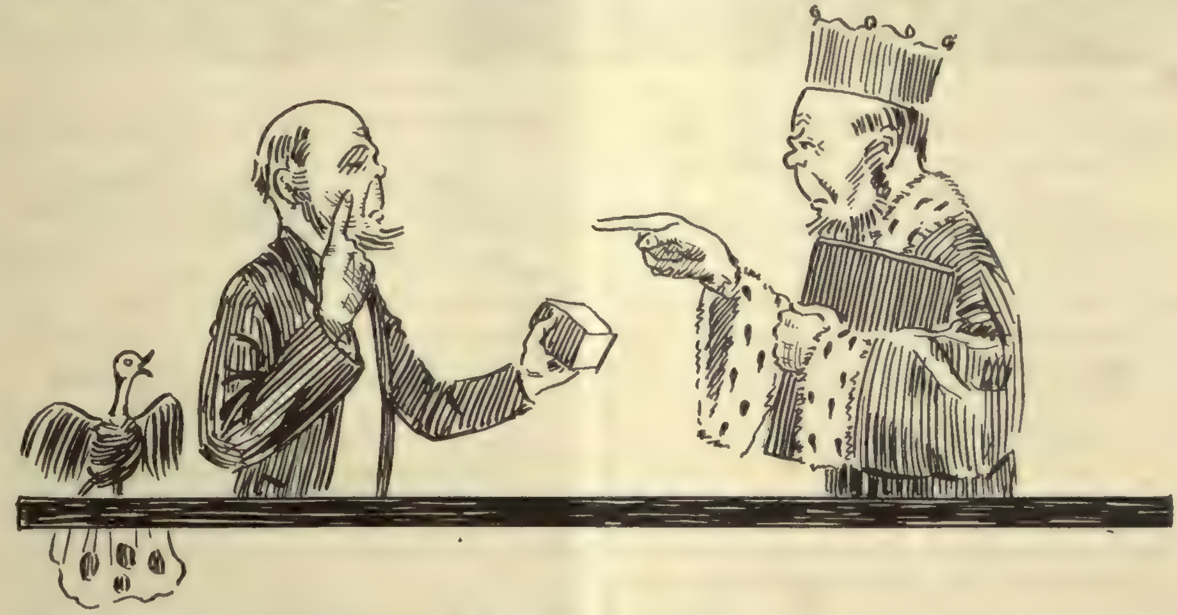
Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., is distributing pamphlet 3952 on 1200-1500-volt, direct-current railway equipments. The pamphlet illustrates and describes a number of schematic diagrams of high-voltage equipment showing changeover switches, motor connections, dynamotor compressor and master controller.

Electric Service Supplies Company, Philadelphia, Pa., has just issued an attractive thirty-two-page booklet on its "Golden Glow" headlights, searchlights and projectors. The theory underlying golden glow light and its adaptation to headlights is given, as are reasons for the design of golden glow and parabolic reflectors. In addition, the different headlights for city and suburban service are described and illustrated.

NEW PUBLICATIONS

Proceedings New York Electric Railway Association, 1916. Published by the association. William F. Stanton, Schenectady Railway, secretary. 208 pages. Cloth.

This volume constitutes the thirty-fourth annual report of the New York association, and covers the quarterly meeting held in Albany on Feb. 24-25 and the annual meeting in Niagara Falls on June 27-28, 1916.



Peacock
The Infallible Brehon of Brake Law

The Brehons were the judges or law interpreters of the Irish for many centuries—and a mighty influential lot of men they were.

But that good old Celtic specification of "You've got to make good" extended even to the highly respected Brehons.

For it was distinctly stated that "If the Brehon delivers a false or unjust judgment, he shall lose not only his fee but be liable for damages in addition."

Isn't it a fact that many a road is wishing today that it could make some alleged judge of braking problems return the price of the equipment plus the accident expense of misinterpretation!

No other operating question has to be handled with more care and conscience than that of brakes.

Peacock Brake Judgment of your service requirements and **Peacock Brake Equipment** to fulfill those requirements make exactly the combination you need to dismiss the braking problem for all time.

The Eccentric Drum

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Correspondence regarding our service is invited.
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Have You a REAL Return Circuit?

You can have one by bonding all your rail joints with the

Lincoln Bonding System

With it, you are sure to secure the highest possible conductivity, because the Lincoln System assures an actual flow of the copper into the steel and of the steel into the copper at the bond head.

Although bond and rail are merged into one structure, the crystalline nature of the rail is not altered.

Remember, too, that the Lincoln System will save you from 20 to 50 cents per bond. May we send further details?

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A Word to Employers

You can secure just the man you desire to strengthen your organization by placing an advertisement in the Searchlight Section of the

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This paper is read by progressive men, many of whom are ambitious for better positions than they now have. They study our "Positions Vacant" columns each week for opportunities for advancement.

You can get in touch with a number of these competent men and select the one best fitted for your needs, by stating in an advertisement in our Searchlight Section the experience and qualifications you require and telling what you have to offer. The cost will be only 3 cents a word, minimum charge $1.50 an insertion.

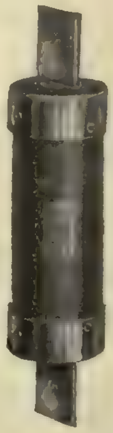
We suggest that you use in the advertisement either your own name, that of one of your employees, or a local post office box number or street address, so that the replies (letters and telegrams) will come direct to you. If you prefer to have the replies addressed to a box number in one of our offices, they will be enclosed in new envelopes and remailed to you promptly each day.

Hundreds of prominent employers now use this method of securing the men needed in their organizations. May we not help you also?

Electric Railway Journal
239 West 39th Street
New York City

Little Investments that protect big ones— NOARK FUSES

It's a serious matter if the circuit is "shorted" and the fuse does not "blow."



Instantly, feeders and machines are in danger. Loss of property, interrupted service and a whole long chain of troubles threaten.

It is vitally important to use fuses that can be relied upon absolutely to "blow" when they should.

"Noark" fuses are safe and dependable. They are in themselves the assurance of positive protection to circuit and pocket-book. Their mechanical superiority stands out in every test.

Supplied for all voltages and amperages.

Why not order the first lot to-day and watch them in action?

Serves more people in more ways than any other Institution of its kind in the world.

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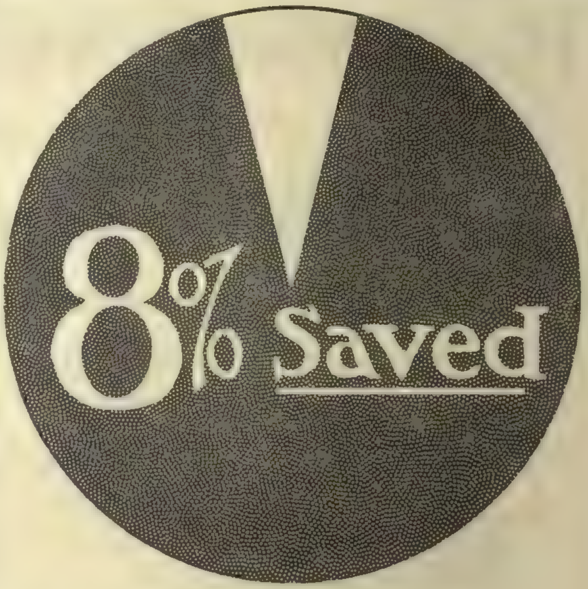

How to make this saving on your property

When you look over the records you'll find about *8% or more of the income* being absorbed by claims.

When you go further, you'll find that most of these claims originate as platform accidents.

You can prevent these—as well as make equally as gratifying economies in schedules and car operation, by making Drew Safety Motorman's Mirrors standard equipment on every car.

There is a Drew Safety Mirror for every car model

The Drew Safety Mirror gives the motorman a clear view of the passenger boarding or leaving the car—without distracting his attention from the road ahead. You can readily see the advantage of this extra check on "stop and go signals."

The cost is very small compared to the saving

The price of the standard Drew Safety Mirror, for installation outside the vestibule, is $3.50 each. The cost of the Prepayment Model is $4.50. *Just one accident prevented*—will more than pay for complete equipment on all your cars.

It will pay you to investigate. Information on request.

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of design, selection of material, and quality of manufacture that distinguishes every bit of line material in the Anderson line, is exemplified in our

Porcelain Strain Insulators

There is never the slightest doubt as to their mechanical or dielectric strength, for both *must* conform to Anderson high-standard specifications.

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Cross Ties

Steel Ties are making steady progress in displacing wood ties. There are several reasons for this:

1st.—The life of one steel tie is about equivalent to that of three wood ties.

2nd.—Owing to the longer life of steel ties there is a saving in labor cost equal to the difference in cost of removing and installing one steel tie and three wood ties.

3rd.—At the end of their serviceability steel ties have a scrap value of approximately one-third of their original cost.

The mark of quality — It protects the user

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Allis-Chalmers Parsons Steam Turbines

Show sustained economy after years of operation
Units built in sizes from 200 K.W. up

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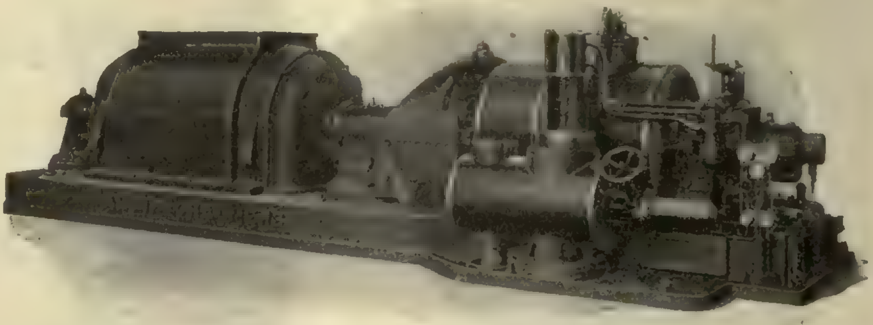

3200 KW., Max. 3600 R.P.M., H. P. Condensing Steam Turbine and Alternator. Unit of this size installed in the plant of the Eastern Pennsylvania Ry. Co., Palo Alto, Pa.

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For Electric Railway Repair Shops

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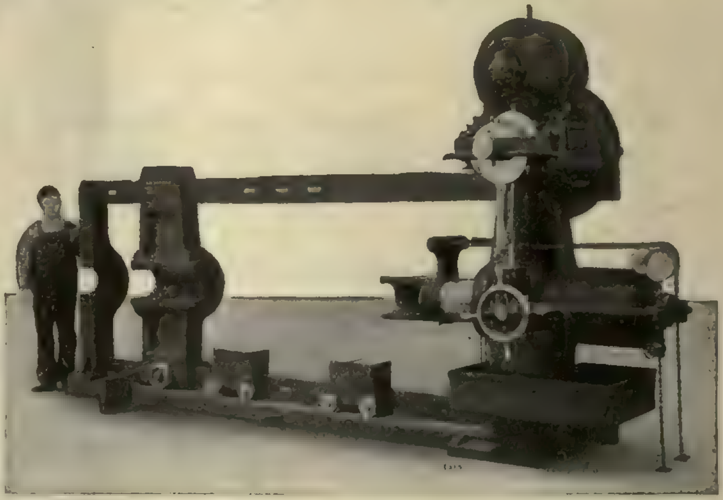

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48" 300 and 400 ton presses are built with cast steel cylinders and resistance posts to enable them to withstand great pressures. Hence wheels can be kept very tight on axles and yet removed and forced on again quickly. Our presses are built throughout with the same care and precision used in making our high grade machine tools.

We also build axle lathes, standard boring mills, planers, shapers, lathes, milling machines, drills, etc.

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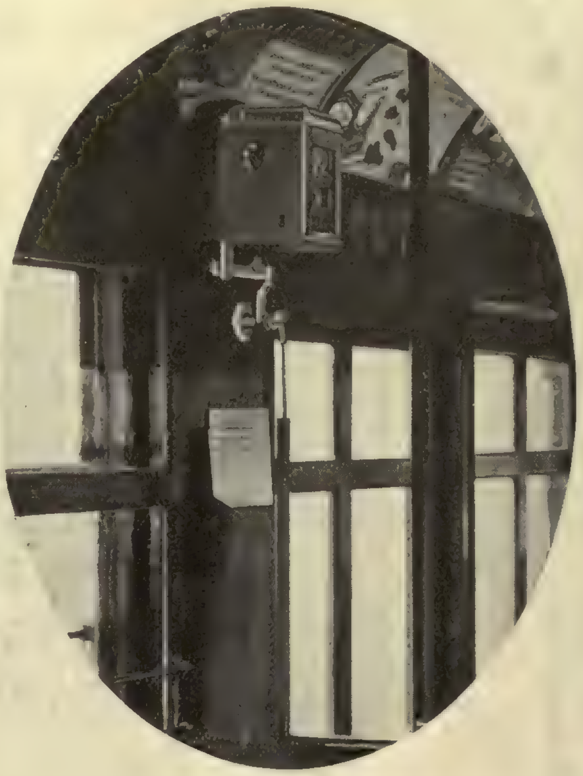

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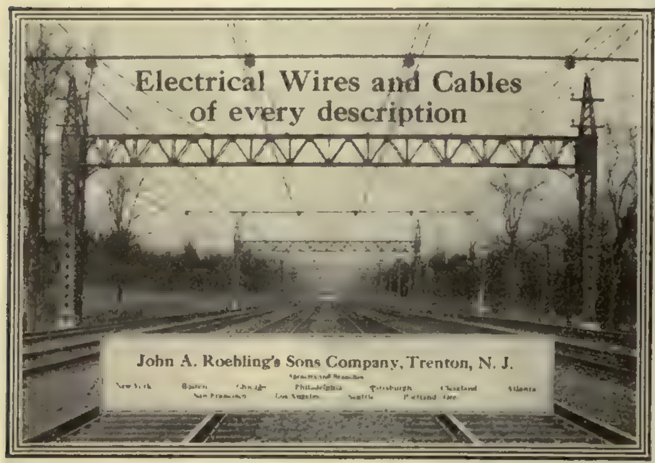
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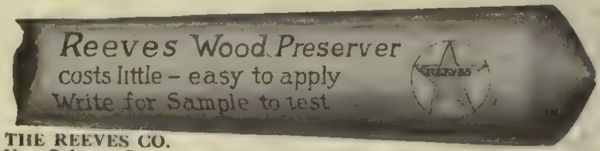
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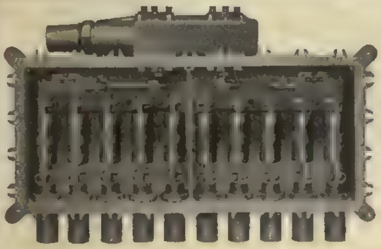

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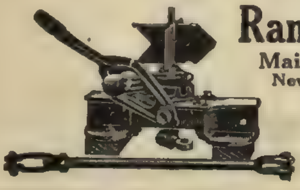

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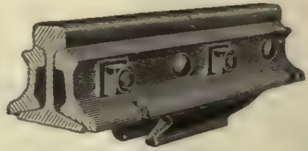

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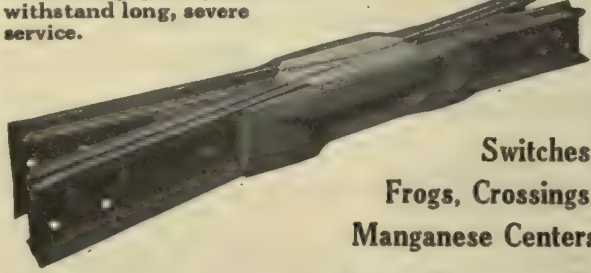

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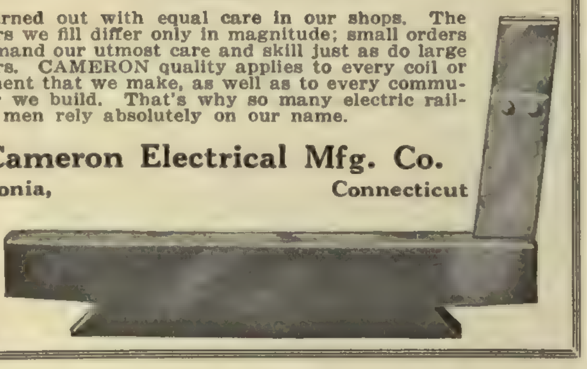

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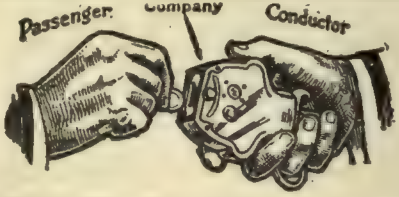

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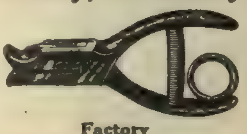

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Multi-Vapo-Gap Lightning. Arresters and Hydrogrounds.
Trigger Lock Reversible Controller Fingers.
"Q-P" Trolley Catchers.
Soldered Rail Bonds.
Friction and Insulating Tapes.
Sterling Ticket Punches.
Controller Handles.

LMC

LORD MFG. CO.,
105 W. 40th St., New York

E. G. Long Company

EDWARD H. MAYS, President
Offices, 50 Church Street, New York

SPRINGS
CASTINGS
FORGINGS

Peckham Truck Parts
Diamond Truck Parts
Car and Truck Accessories

ELECTRICAL REPRESENTATIVES
Union Spring & Mfg. Co.
Leaf and Coil Springs
MCB Pressed Steel Journal Box Covers

Rollway Bearings
are Sensible Bearings

If anti-friction bearings were not designed to assure easy installation and replacement by your shopmen, their power, lubrication and inspection savings would not be obtainable in practice.

Rollway Bearings are long past the experimental stage. We *know* just what they can do in city, suburban and interurban service. We offer you a sensible, standard product.

Write us today for service records.

The Railway
Roller Bearing Co.
Syracuse, N. Y.

TRADE MARK

AJAX

Ajax Car Brasses are standard on many of the largest roads in the country. A line from you will bring interesting information on Ajax Plastic Bronze—the most successful of all railroad bearing metals.

THE AJAX METAL COMPANY
Philadelphia, Pa. Birmingham, Ala.
and Branch Offices in Principal Cities

AJAX

TULC

We base all our "ads" on facts. We guarantee TULC and stand back of it. Others have shown a large saving with TULC. It has been proven to be the best lubricant.

THE UNIVERSAL LUBRICATING CO.
Schofield Building CLEVELAND, O.

The "Hycap-Exide" Battery
for
STORAGE BATTERY STREET CARS
THE ELECTRIC STORAGE BATTERY CO
PHILADELPHIA

JACKS
Barrett Track and Car Jacks
Barrett Emergency Car Jacks
Duff Ball Bearing Screw Jacks
Duff Motor Armature Lifts

The Duff Manufacturing Co., Pittsburgh, Pa.

"Boyerized" Products Reduce Maintenance

Bemis Trucks
Case Hardened Brake Pins
Case Hardened Bushings
Case Hardened Nuts and Bolts
Manganese Brake Heads
Manganese Transom Plates
Manganese Body Bushings
Bronze Axle Bearings

Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.

Bemis Car Truck Co., Springfield, Mass.

VAN DORN COUPLERS
are made for every condition and requirement. M. C. B. Pin and Link, Car and Air, in all sizes and types.

VAN DORN COUPLER CO.
2325 So. Pauling St., Chicago, Ill.

SEARCHLIGHT SECTION

IMMEDIATE SHIPMENT

400 Kilowatt 60 Cycle Rotary Converter

1—400 KW. Westinghouse, 3 ph., 60 cy., 370 v. A. C., 575 v. D. C., speed 600 revolutions.

200 Kilowatt 60 Cycle Rotary Converters

2—200 KW. Westinghouse, 3 ph., 60 cy. rotary converters, 370 v. A. C., 575 v. D. C., 720 rpm., with starting motors, also transformers if desired.

150 Kilowatt 60 Cycle Rotary Converters

2—150 KW. Westinghouse 3 phase, 60 cycle rotary converters, 550 volts, 273 amps., 720 r.p.m., complete with 4—100 KW. Westinghouse Scott connected oil insulated transformers, 10,000/9500 volts prim., 430/362 volts secy.

150 Kilowatt 25 Cycle Rotary Converters

2—150 KW. General Electric type T. C., 4-150-750, 25 cycle, 3 phase, 575 volt, rotary converters, 750 r.p.m., complete with end play and speed limit device.

Transformers

3—185 KVA. Gen. Elec., type A. C., 25 or 60 cycles, 2300 volts primary, 430 volts secondary.

4—125 KW. Westinghouse transformers, single phase, 60 cycles, 15,000 volts primary, 340/360 v. secondary.

4—100 KW. Westinghouse transformers, oil insulated, single ph., 60 cy., 2300 v. primary, 360 v. secondary.

4—100 KW. Westinghouse, oil insulated, Scott connected transformers, 10,000/9500 v. primary, 430/362 v. secondary.

3—75 KW. Westinghouse, oil insulated, 60 cycle, 6600 or 13,200 v. primary, 220 v. secondary.

Railway Motors

2—75 to 90 HP. Westinghouse No. 112 Railway Motors, newly rewound, practically new.

IMMEDIATE DELIVERY

ARCHER & BALDWIN
114-118 Liberty Street New York City
TELEPHONE 4337-4338 RECTOR

CARS FOR SALE

OPEN and CLOSED
MOTOR and TRAIL
Write for Price and Full Particulars to
ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

Wanted Daily 100,000 Lbs.

CLEAN COPPER SCRAP
NEW BRASS CLIPPINGS
SHRAPNEL CASE SCRAP

CONSOLIDATED ROLLING MILLS & FOUNDRIES CO. INC.
25 BROAD ST., NEW YORK CITY

MACGOVERN & COMPANY, Inc.

114 LIBERTY STREET NEW YORK CITY

Steam and Electrical Machinery

Air Compressors, Pumps, Hoists, etc.

MOTORS FOR SALE

Four 3½ h.p. direct load 500 volt D.C., series wound, fully enclosed Standard Crocker Wheeler Crane motors, extra extension shaft, equipped with solenoid brake.

Four 1½ h.p. 500 volt D.C., series wound fully enclosed Standard Crocker Wheeler Crane motors.

These motors are in first-class shape. Will quote low figure for prompt disposition.

Address Geo. M. Ryall, 390 Pacific Electric Bldg., Los Angeles, Cal.

FOR SALE

250 K. W. 550 volt Westinghouse Generator direct connected to Hamilton Tandem Compound Engine. Splendid condition, can be inspected under operation.

Mobile Light and Railroad Co.
Mobile, Ala.

COMPLETE ARMATURES FOR SALE

FOR ALL THE STANDARD STREET RAILWAY MOTORS
GET OUR PRICE WE CAN SAVE YOU MONEY
America's Greatest Repair Works
CLEVELAND ARMATURE WORKS, Cleveland, O.

When writing to Advertisers in this publication you will confer a favor on both publisher and advertiser by mentioning the

Electric Railway Journal

Get Your Wants into the Searchlight

SEARCHLIGHT SECTION

Get your Wants into the Searchlight

ADVERTISING RATES

Under "Positions Wanted," including Salesmen looking for new connections, Evening Work Wanted, etc. undisplayed advertisements cost **two cents a word,** minimum charge 50 cents an insertion, **payable in advance.**

Under "Positions Vacant," including Agents and Agencies Wanted, Representatives Wanted, Salesmen Wanted, Partners Wanted, Business Opportunities, Employment Agencies, and Miscellaneous For Sale, For Rent, and Want ads; also Auction Notices, Receivers' Sales, Machinery and Plants For Sale or Wanted, undisplayed advertisements set solid in one paragraph, cost **three cents a word,** minimum charge $1.50 an insertion.

Machinery advertisemenis (undisplayed) set with a paragraph for each item, or tabulated, are charged at 25 cents a line.

If replies are in care of any of our offices, allow five words for the address.

All advertisements for bids (Proposals) cost $2.40 an inch.

ADVERTISEMENTS IN DISPLAY TYPE

cost as follows for single insertions:

$\frac{1}{16}$ p. (1⅛x3⅜ ins.)	$5.00	1 in. (1x2$\frac{3}{16}$ ins.)	$3.00
⅛ p. (2⅜x3⅜ ins.)	10.00	4 inches (4x2$\frac{3}{16}$ ins.)	11.60
¼ p. (5x3⅜ or 2⅜x7 ins.)	20.00	8 inches (8x2$\frac{3}{16}$ ins.)	22.40
½ p. (10¼x3⅜ or 5x7 ins.)	40.00	15 inches	40.50

For space to be used within one year, to be divided to suit requirements of advertiser, provided some space is used at least once a month following first insertion:

1 page	$80 a page	18 pages	$56 a page
3 pages	72 a page	26 pages	52 a page
6 pages	64 a page	32 pages	50 a page
9 pages	62 a page	40 pages	48 a page
12 pages	58 a page	52 pages	45 a page

In replying to advertisements, do NOT enclose original testimonials, or anything that you may want returned. State your qualifications in as concise and neat a manner as you can and enclose COPIES of testimonials. In machinery ads, use a local name or address if possible so that readers can wire direct and get quick replies.

FOR SALE

Generating Set for Sale

1—300 hp. Buckeye tandem compound engine 14¼" and 25 x 21", 20" stroke, 200 r.p.m., non-condensing, capable of developing 35% in excess of this capacity, direct connected to a 3-phase, 200 kw., 60 cycle General Electric generator. This generating set is in good condition. Immediate shipment can be made. If interested, address Morden Frog & Crossing Works, 208 South La Salle Street, Chicago.

Armature Coils

3 Sets GE-1200 Railway Motor Armature coils. Catalog No. 18069. Immediate shipment. If interested address Hagerstown & Frederick Ry. Co., Terminal Bldg., Frederick, Md.

Rails

75 tons 80
500 " 68
200 " 60
600 " 56
50 " Girder Rails
20 " Flat Rails

OR ANY OTHER SECTION

Why buy new when these are practically as good.
Also see our list of
LOCOS., CARS, EQUIPMENT, MACHINERY, TANKS
Before Buying

ZELNICKER IN ST. LOUIS

General Offices—325 Locust Street
423 First National Bank, Chicago
910 Hennen Building, New Orleans

FOR SALE

Stock Taking Time

Now is the time to turn the surplus stock of metals you have on hand into cash. We buy all grades of scrap metals, small lots as well as large lots. Write us today and tell us what you have and we will be pleased to quote you prices. National Metal & Rubber Company, 30-31 India Wharf, Boston, Mass.

No. 18 Dorner Trucks

Prefer to sell frames only without wheels or axles at $50. Good condition. Address U. T. Co. of Indiana, Anderson, Indiana.

POSITIONS WANTED

GENERAL manager electric railway and lighting properties open for position. Twenty years' experience handling properties for large banking concern. Box 1236, Elec. Ry. Jour., 935 Real Estate Trust Bldg., Philadelphia, Pa.

Get Your Wants into the Searchlight

POSITIONS WANTED

SITUATION wanted in car barn electrical department, by young man. Three years' electrical inspection in steel mills, some knowledge of electric car work, I. C. S. student, single and strictly sober, would take foremanship on small road. Write 567 Cypress Ave., Moxham, Johnstown, Pa.

YOUNG man, six years in executive offices large Eastern street railway and lighting company. Now law clerk legal department. College graduate; member of bar. Can handle legal and claim work. Good assistant to busy executive. Box 1223, Elec. Ry. Jour., 935 Real Estate Trust Bldg., Philadelphia, Pa.

YOUNG man wants position as assistant to busy executive. Experienced in lighting field and intimate knowledge of electric railways through intensive research work. Practical, resourceful and energetic. Box 1283, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

POSITIONS VACANT

EXPERIENCED cost and quotation clerk wanted, electrical supply house. State age, experience, salary. Box 1259, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

Undisplayed
Cards Under
Positions Wanted
Cost 50 Cents
for 25 Words

Keep Your Eyes on the Journal's Searchlight Section

Machinery
Advertisements
Undisplayed
Cost $1.50
for 50 Words

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

More than 300 different products are here listed.
The Alphabetical Index (see eighth page following) gives the page number of each advertisement.
As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.
If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will promptly furnish the information.

Acetylene Apparatus. (See Cutting Apparatus, Oxy-Acetylene.)

Acetylene Service.
Oxweld Acetylene Co.
Prest-O-Lite Co., Inc.

Advertising, Street Car.
Collier, Inc., Barron G.

Air Cleaners.
Lord Mfg. Co.

Air Rectifiers.
Lord Mfg. Co.
National Safety Device Co.

Alloys and Bearing Metals. (See Bearings and Bearing Metals.)

Alloys, Steel and Iron.
Titanium Alloy Mfg. Co.

Anchors, Guy.
Electric Service Supplies Co.
Holden & White.
Johns-Manville Co., H. W.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Anti-Climbers.
Railway Improvement Co.

Automobiles and Buses.
Brill Co., The J. G.

Axle Straighteners.
Columbia M. W. & M. I. Co.

Axles, Car Wheel.
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Cincinnati Car Co.
St. Louis Car Co.
Standard Steel Works Co.
Westinghouse Elec. & M. Co.

Babbitting Devices.
Columbia M. W. & M. I. Co.

Badges and Buttons.
Electric Service Supplies Co.
International Register Co., The

Bankers and Brokers.
National City Co.

Batteries, Dry.
Johns-Manville Co., H. W.

Batteries, Storage.
Electric Storage Battery Co.

Bearings and Bearing Metals.
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Hardy & Sons Co., Wm. A.
Long Co., E. G.
More-Jones Brass & M. Co.
St. Louis Car Co.
Westinghouse Elec. & M. Co.

Bearings, Center.
Baldwin Locomotive Works.
Holden & White

Bearings, Oilless, Graphite, Bronze and Wood.
Bound Brook Oil-less Bearing Co.

Bearings, Roller and Ball.
Hess-Bright Mfg. Co.
Gurney Ball Bearing Co.
Railway Roller Bearing Co.

Bearings, Roller Side.
Holden & White.

Bells and Gongs.
Brill Co., The J. G.
Electric Service Supplies Co.
St. Louis Car Co.

Benders, Rail.
Niles-Bement-Pond Co.
Zelnicker Sup. Co., W. A.

Blow Torches for Soldering and Brazing. (See Cutting Apparatus, Oxy-Acetylene.)

Blowers.
General Electric Co.
Westinghouse Elec. & M. Co.

Boilers.
Babcock & Wilcox Co.

Boiler Cleaning Compounds.
Dearborn Chemical Co.
Johns-Manville Co., H. W.

Boiler Coverings
Johns-Manville Co., H. W.

Bond Clips.
Electric Railway Improve. Co.

Bond Testers.
American Steel & Wire Co.

Bonding Apparatus.
Electric Railway Improve. Co.
Ohio Brass Co.
Oxweld Acetylene Co.
Prest-O-Lite Co., Inc.

Bonding Tools.
American Steel & Wire Co.
Electric Railway Improve. Co.
Electric Service Supplies Co.
Ohio Brass Co.

Bonds, Rail.
American Steel & Wire Co.
Electric Railway Improve. Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Bonds Welded.
Lincoln Bonding Co.

Book Publishers.
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel.
Niles-Bement-Pond Co.

Braces, Rail.
Kilby Frog & Switch Co.

Brackets and Cross Arms. (See also Poles, Ties, Posts, Etc.)
Bates Expanded Steel Truss Co.
Electric Service Supplies Co.
Int'l Creosoting & Constr. Co.
Lindsley Bros. Co.
Ohio Brass Co.

Brake Adjusters.
Holden & White.
Smith-Ward Brake Co.

Brake Shoes.
Amer. Brake Shoe & Fdy. Co.
Barbour-Stockwell Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Long Co., E. G.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts.
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Holden & White
Long Co., E. G.
Lord Mfg. Co.
National Brake Co.
National Safety Device Co.
St. Louis Car Co.
Westinghouse Trac. B. Co.

Brooms, Track, Steel or Rattan.
Zelnicker Supply Co., W. A.

Brush Holders.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Brushes, Carbon.
Dixon Crucible Co., Jos.
General Electric Co.
Jeandron, W. J.
Morgan Crucible Co.
Westinghouse Elec. & Mfg. Co.

Brush Holders.
Anderson Mfg. Co., A. & J. M.

Bumpers, Car Seat.
Electric Service Supplies Co.

Bunting.
Boyle & Co., Inc., John.

Bushings, Case Hardened and Manganese.
Bemis Car Truck Co.

Bushings, Fibre.
Diamond State Fibre Co.

Bushings, Graphite and Wooden.
Bound Brook Oil-less Bearing Co.

Buttons. (See Badges and Buttons.)

Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.)

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc.—(See those headings.)

Car Trimmings. (For Curtains, Registers, Doors, Seats, etc., see those headings.)

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cincinnati Car Co.
Jewett Car Co.
Kuhlman Car Co., G. C.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Second Hand.
Electric Equipment Co.

Cars, Self-Propelled.
Electric Storage Battery Co.
General Electric Co.

Car Stops, Automatic.
Consolidated Car-Heating Co.

Castings, Brass.
Frankel Connector Co.
More-Jones Brass & M. Co.

Castings, Composition or Copper.
Anderson Mfg. Co., A. & J. M.

Castings, Gray Iron and Steel.
Amer. Brake Shoe & Fdry. Co.
American Steel Foundries.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Long Co., E. G.
St. Louis Car Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.

Castings, Malleable and Brass.
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Long Co., E. G.
St. Louis Car Co.

Catchers and Retrievers, Trolley.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Holden & White.
Long Co., E. G.
Lord Mfg. Co.
Ohio Brass Co.
Wood Co., Chas. N.

Ceiling, Car. (See Headlining.)

Charging Sets, Storage Battery.
General Electric Co.

Cheese Cloth.
Boyle & Co., Inc., John.

Chemists.
Little, Inc., Arthur D.

Circuit Breakers.
Cutter Electrical & Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Clamps.
Frankel Connector Co.

Clamps and Connectors for Wires and Cables.
Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co.
Frankel Connector Co.
General Electric Co.
Klein & Sons, Mathias.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Cleaners and Scrapers, Track. (See also Snow - Plows, Sweepers and Brooms.)
Brill Co., The J. G.
Cincinnati Car Co.
Ohio Brass Co.

Cleats, Car Wiring.
General Electric Co.

Clusters and Sockets.
General Electric Co.

Coal and Ash Handling. (See Conveying and Hoisting Machinery.)

Coasting Clocks.
Railway Improvement Co.

Coil Banding and Winding Machines.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Coils, Armature & Field.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Independent Lamp & Wire Co.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coin-Counting Machines.
International Register Co., The
Johnson Fare Box Co.

Commutator Slotters.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Wood Co., Chas. N.

Commutator Truing Devices.
General Electric Co.

Commutators or Parts.
Cameron Elec'l Mfg. Co.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
Westinghouse Elec. & M. Co.

Compressors, Air.
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Trac. B. Co.

Condensers.
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Model 341
A.C. and D.C. Voltmeter

One of the Portable Electrodynamometer Group, which also includes Model 310 Single Phase D. C. Wattmeters, Model 329 Polyphase Wattmeter, and Model 370 A.C. and D.C. Ammeter.

The characteristics of the group are extreme accuracy (guaranteed within a fraction of 1% full scale value), adaptability for use on circuits of any commercial frequency and any wave form, great overload capacity, low moment of inertia, effective damping and shielding, and the legibility and remarkable uniformity of the hand calibrated scales.

The Building-In of Ideals

"Good enough to serve the purpose" never has been an acceptable standard for

Weston

Indicating Instruments

The entire energies of our organization have been devoted to making each Instrument contribute its maximum toward perfecting the Art of Electrical Measurement.

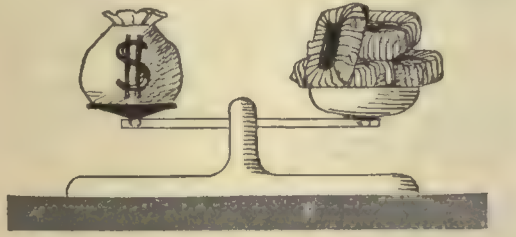
It is this guiding purpose which has created for the Weston name the unique and enviable position it occupies in its field.

Weston Indicating Instruments include a great variety of groups for portable or switchboard service on A. C. or D. C. Circuits, Instruments designed expressly for testing and laboratory use, for motor car and boat electrical systems, and many others for special purposes. Write for Bulletins or Catalogs describing those which interest you.

Weston Electrical Instrument Company

21 Weston Ave., Newark, N. J.

New York
Philadelphia
Pittsburgh
Cleveland
Cincinnati
Chicago
Boston
Buffalo
Richmond
San Francisco
Denver
Detroit
St. Louis
Toronto
Winnipeg
Montreal
Vancouver
Berlin
London
Paris
Petrograd
Florence
Johannesburg, S. Africa



They're as Good as Cash

—those old field coils in your shops. Copper is worth too much to send to the melting pot. Send those old coils to us—let us remove the old insulation, clean and anneal the wire and reinsulate it with

Salamander Pure Asbestos

We will then rewind the wire into new coils of precisely the same characteristics as the old ones.

This is much cheaper for you than buying new coils, for the only charge we make is a very small one for the actual insulation used.

Send us some of those old coils so we can show you what we can do.

Independent Lamp & Wire Co., Inc.

Offices: 1737 Broadway, New York
FACTORIES: York, Pa., and Weehawken, N. J.

U. S. Metal & Mfg. Co.

165 BROADWAY, NEW YORK CITY
Chicago
Washington, D. C.

RAILWAY SUPPLIES

SELLING AGENTS FOR

Tool Steel Gears and Pinions
Johnson Fare Box
Perry Side Bearings
Hartman Centering Center Plates
Wasson Trolley Bases
Garland Ventilator
Electric Arc Welders
High Class Railway Varnishes and Enamels

Special Agents for
Tool Steel Gear & Pinion Co.
Johnson Fare Box Co.
C. & C. Electric & Mfg. Co.
Holden & White

General Agents for Anglo-American Varnish Co.
Eastern Agents for Union Fibre Co.

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Conduits, Underground.
Johns-Manville Co., H. W.

Connectors, Solderless.
Frankel Connector Co.

Controller Fingers.
Lord Mfg. Co.

Controller Handles.
Lord Mfg. Co.

Controller Regulators.
Electric Service Supplies Co.

Controllers or Parts.
Allis-Chalmers Mfg. Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Eureka Co.
General Electric Co.
Johns-Manville Co., H. W.
Westinghouse Elec. & M. Co.

Controlling Systems.
General Electric Co.
Westinghouse Elec. & M. Co.

Converters, Rotary.
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Conveying and Hoisting Machinery.
Green Engrg. Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The.
Long Co., E. G.
Roebling's Sons Co., John A.
Samson Cordage Works.

Cord Connectors and Couplers.
Electric Service Supplies Co.
Samson Cordage Works.
Wood Co., Chas. N.

Cotton Duck.
Boyle & Co., Inc., John.

Couplers, Car.
Brill Co., The J. G.
Cincinnati Car Co.
Long Co., E. G.
Ohio Brass Co.
Van Dorn Coupler Co.
Westinghouse Trac. B. Co.

Cranes. (See also Hoists.)
Allis-Chalmers Mfg. Co.
Niles-Bement-Pond Co.

Creosoting. (See Wood Preservatives.)

Cross Arms. (See Brackets.)

Crossing Foundations.
International Steel Tie Co.

Crossing Signals. (See Signals, Crossing.)

Crossings, Track. (See Track, Special Work.)

Culverts.
Canton Culvert & Silo Co.

Curtains and Curtain Fixtures.
Brill Co., The J. G.
Electric Service Supplies Co.
Hartshorn Company, Stewart.
Pantasote Co., The.
St. Louis Car Co.

Cutting Apparatus, Oxy-Acetylene.
Oxweld Acetylene Co.
Prest-O-Lite Co., Inc.

Derailing Devices. (See also Track Work.)
Cleveland Frog & Crossing Co.

Despatching Systems.
Simmen Automatic Ry. Sig. Co.

Destination Signs.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Detective Service.
Wisch Service, P. Edward.

Door Operating Devices.
Consolidated Car-Heating Co.
National Pneumatic Co.

Doors and Door Fixtures.
Brill Co., The J. G.
General Electric Co.
Hale & Kilburn Co.

Doors & Shutters, Fireproof.
Kinnear Mfg. Co.

Doors, Asbestos.
Johns-Manville Co., H. W.

Doors, Folding Vestibule.
National Pneumatic Co.

Doors, Steel Rolling.
Kinnear Mfg. Co.

Draft Rigging. (See Couplers.)

Drills, Track.
American Steel & Wire Co.
Electric Service Supplies Co.
Long Co., E. G.
Niles-Bement-Pond Co.
Ohio Brass Co.

Dryers, Sand.
Electric Service Supplies Co.
Zelnicker Sup. Co., W. A.

Engineers, Consulting, Contracting and Operating.
Archbold-Brady Co.
Arnold Co., The.
Byllesby & Co., Inc., H. M.
Drum & Co., A. L.
Ford, Bacon & Davis.
Hunt & Co., Robert W.
Jackson, D. C. & Wm. B.
Little, Inc., Arthur D.
Richey, Albert S.
Roosevelt & Thompson.
Sanderson & Porter.
Scofield Engineering Co.
Stephenson Sons Co., S.
Stone & Webster Eng. Corp.
White Companies, J. G.
Woodmansee & Davidson, Inc.

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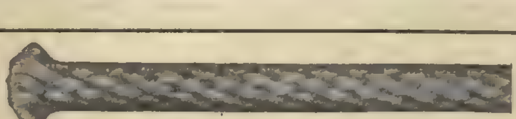

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Kiko Hustha

Hilarity is foreign to the native India character. He takes his empty life seriously and smiles only on rare occasions.

If he steps on an empty banana or does any of the stunts portrayed on the Sunday comic page he's serious, and should you laugh he quickly comes back at you with "Kiko hustha?" (Why do you laugh). He can't see the reason for smiling any more than can an operator understand our smile when we see him seriously struggling to get decent motor service from cheap or misapplied carbon brushes.

In both cases their training has not been modern and therefore they can't catch the point.

We certainly cannot develop a sense of humor for the former, but perhaps we can supply a sense of values for the latter, so here's Lesson No. 1:

Cheap brushes are expensive when you figure in terms of cost per year for brushes and for commutator maintenance. Cheap brushes are chosen from a dope sheet—that's taking chances.

Morganite brushes are prescribed for the service by brush engineers—that puts responsibility for proper service directly up to us.

Once a man gets Morganite brushes on the job—he too can laugh up his sleeve at the fellow who thinks he has a serious job in making motors mote.

The
Morgan Crucible
Company Limited
120 Liberty St, New York City

Factory, Brooklyn, N. Y.

AGENTS:

Lewis & Roth, 1012 Liberty Bldg., Philadelphia

Electrical Engineering & Mfg. Co.
First National Bank Bldg., Pittsburgh

W. L. Rose Equipment Company, La Salle Bldg.
St. Louis, Mo.

Herzog Electric & Eng'g Co., 150 Steuart St.,
San Francisco, Cal.

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NOTICE TO ADVERTISERS:

Printing begins on Tuesday of each week.

Changes of copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for OK before publication.

New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.

If proofs before printing are required, change of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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TITANIUM-TREATED RAIL

Saves Money on Curves—
Why Not on Tangents Also?

A logical question—and the Brooklyn Rapid Transit Co. answered it by specifying Titanium-treated for all its tangent track bought for 1914 and 1915.

Comparative tests in other cities, under actual every-day service, show that Titanium-treated rails outwear untreated rails—the average increase of life is over 40%.

More than that—Titanium-treated rails are more ductile—they are safer rails.

"Rail Reports"

will give you some interesting facts—write for a copy.

TITANIUM ALLOY MANUFACTURING COMPANY

Operating Under Rossi Patents **Processes and Products Patented**

General Office and Works:
Niagara Falls, N. Y.

TPC
Reg. U. S. Pat. Off.
TRADE MARK.

Pittsburgh Office: Oliver Building
Chicago Office: Peoples Gas Building

New York Office: 15 Wall Street

AGENTS:

Pacific Coast: ECCLES & SMITH CO., Los Angeles, San Francisco, Portland
Great Britain and Europe: T. ROWLANDS & CO., Sheffield, England

Adaptation to Present Standards A Self-Evident Feature of Gurney Radio-Thrust Bearings

This picture from the shops of the Chautauqua Traction Company is graphic evidence of some Gurney achievements in making the advantages of Gurney ball-bearings available to electric railways.

The truck is a standard Baldwin design in all respects except for a little different turning of the axles.

The Gurney radio-thrust ball-bearing journal boxes on this truck are made within the standard clearances.

The degree of "skill" and the kind of "tool" required to put on or take off a Gurney ball-bearing journal box are self-evident!

CAPACITY GURNEY ENDURANCE

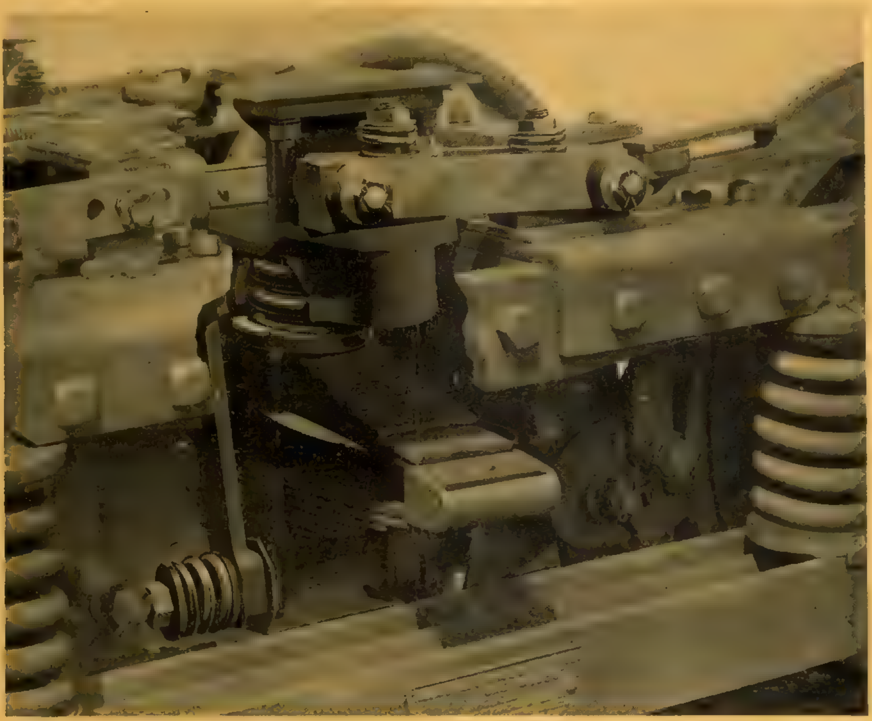
Gurney Ball Bearing Co.

Conrad Patent Licensee

Chicago, Ill. **Jamestown, N. Y.** New York City

CAPACITY GURNEY ENDURANCE

Improved Construction for Brill Trucks



THREE very important improvements in Brill truck design recently have been installed as standard on the various Brill trucks to which they are applicable. These improvements are the Brill (patented) Graduated Spring System, the Brill (patented) Bolster Guide and the Brill (patented) Side-swing Dampener. These in combination produce an ease and steadiness of riding on tangents, curves, during acceleration and braking that is distinctly noticeable. The Brill Bolster Guide, together with the Graduated Spring System, protects the car from the choppy, vertical motion which commonly is set up in the trucks by brake application or by motor acceleration and the Side-swing Dampener restricts, without preventing, the side easement. The Bolster Guide and the Graduated Spring System are standard in all the well-known types of Brill pivotal trucks and the Side-swing Dampener is standard in all swing-bolster trucks in which spring planks are employed.

THE J. G. BRILL COMPANY
Philadelphia, Pa.
AMERICAN CAR COMPANY
St. Louis, Mo.
G. C. KUHLMAN CAR CO.
Cleveland, Ohio
WASON MANUFACTURING CO.
Springfield, Mass.
COMPAGNIE J. G. BRILL
Paris, France

BRILL

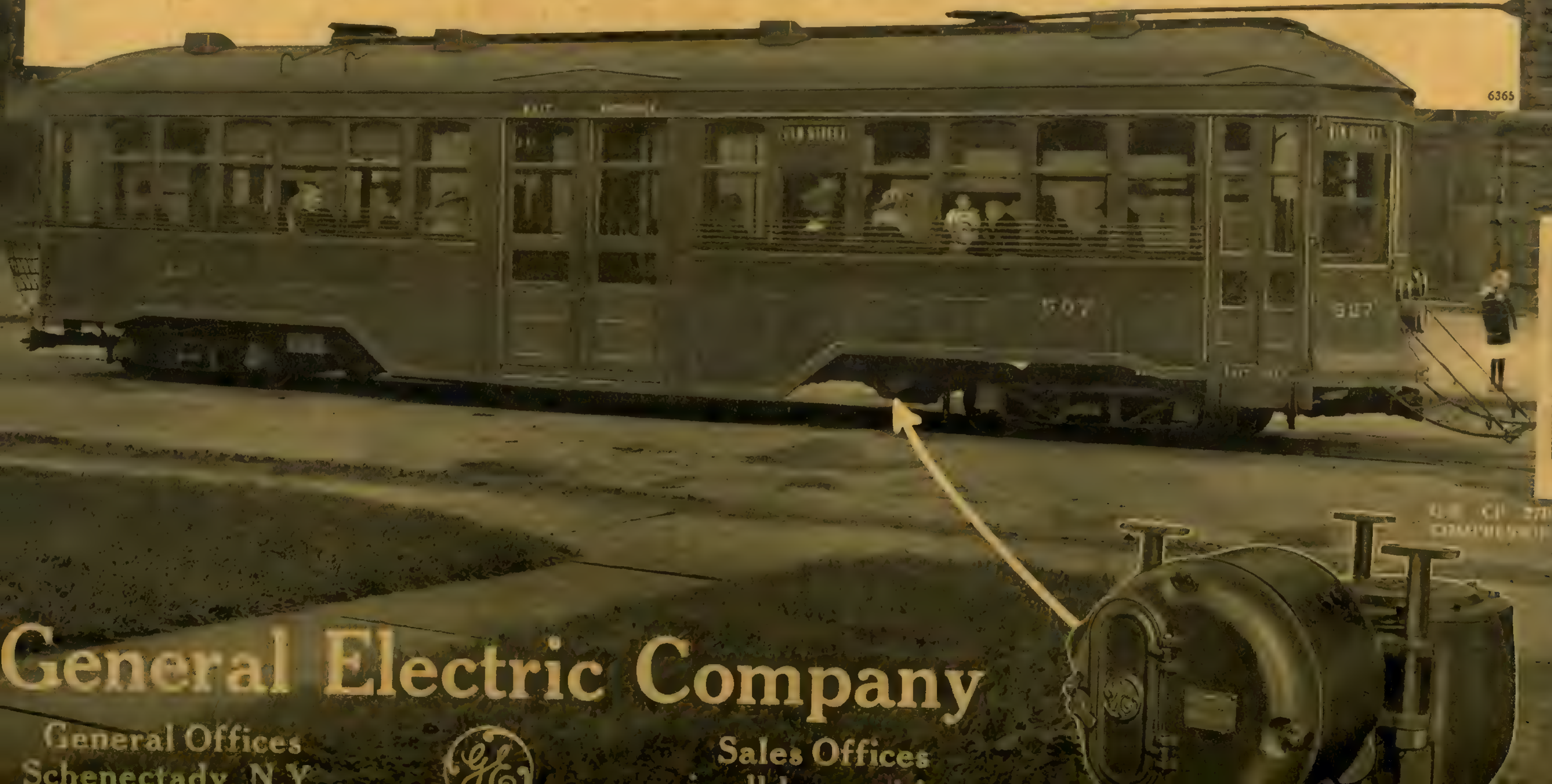
AGENCIES: AUSTRALASIA—Noyes Brothers, Melbourne, Sidney, Dunedin, Brisbane, Perth. BELGIUM and HOLLAND—C. Dubbelman, 48 Rue de Luxembourg, Brussels. ARGENTINE and URUGUAY—C. S. Clarke & Co., Calle 25 de Mayo, No.158, Buenos Aires. NATAL, TRANSVAAL and ORANGE RIVER COLONY—Thomas Barlow & Sons, Durban, Natal. ITALY—Giovanni Checchetti, Piazza Sicilia 1, Milan.

The Latest Youngstown Cars

are of the 24-inch wheel center entrance type.

The Mahoning & Shenango Railway & Light Co., Youngstown, Ohio, selected G-E motors and emergency straight air brakes with CP-27-B compressors for these cars.

The design of the CP-27-B compressor is such that ample clearance between the compressor and roadbed is obtained when mounted on 24-inch wheel cars, as can be seen in the illustration. This compressor is of the well-known G-E center gear type and has a piston displacement of 15.7 cubic feet per minute. Compactness, strength, reliability, accessibility and low maintenance are a few of the reasons why it has been adopted as standard on hundreds of roads.



General Electric Company

General Offices
Schenectady, N. Y.

Sales Offices

R. C. Cram on Cutting Costs in the Maintenance Yard

ELECTRIC RAILWAY JOURNAL

New York, December 23, 1916 McGraw Publishing Co. Inc. Vol. 48, No. 26 10c a copy

ITERNATIONAL
TEEL TWIN TIES

peeding Up Rehabilitation

ere wood tie and concrete construc- is to be rehabilitated, International l Twin Ties can be placed on the ting foundation.

job was speeded up 100 per cent by using International Steel Twin Ties —labor of removing old foundation was entirely eliminated.

Let us submit comparative estimates for your job.

The International Steel Tie Company
General Sales Office and Works: Cleveland, Ohio

Rehabilitating double track on Broadway, Cleveland, Ohio

Christmas Reflections

"JOE," said the General Manager to the Superintendent, "what a wonderful change the past few years have made in the transportation game. We stand here today looking down at the holiday crowds being carried to and fro in greater numbers, with greater safety; greater reliability and greater regularity than ever before, and while we reflect on what has contributed most to this marvelous spectacle before us, we realize that it is due to the genius, energy and foresight of George Westinghouse in harnessing up compressed air and electricity together. First, the air brake, then HL Control, and now safety door devices, whistles, etc.

"These are primarily the things that have made our present fast and reliable schedules possible."

"It's surely wonderful, Boss," answered Joe, "and it's especially gratifying for us to know that we were among the first to recognize the superiority of Westinghouse Railway Motors and HL Control, and to now see over 200 traction companies adopting electro-pneumatic control."

Westinghouse Electric & Manufacturing Company

Sales Offices in All
Large American Cities

East Pittsburgh,
Pennsylvania

496

ELECTRIC RAILWAY JOURNAL

VOLUME XLVII, No. 26 NEW YORK, DECEMBER 23, 1916 PAGES 1281 TO 1326

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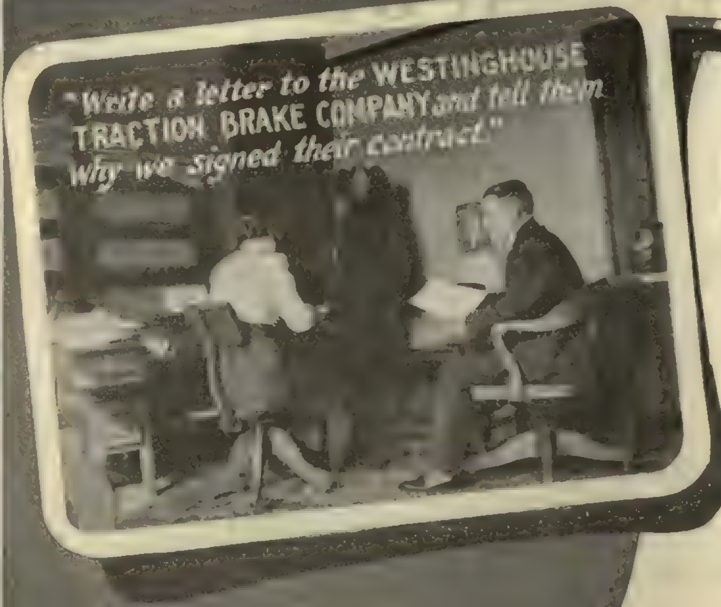
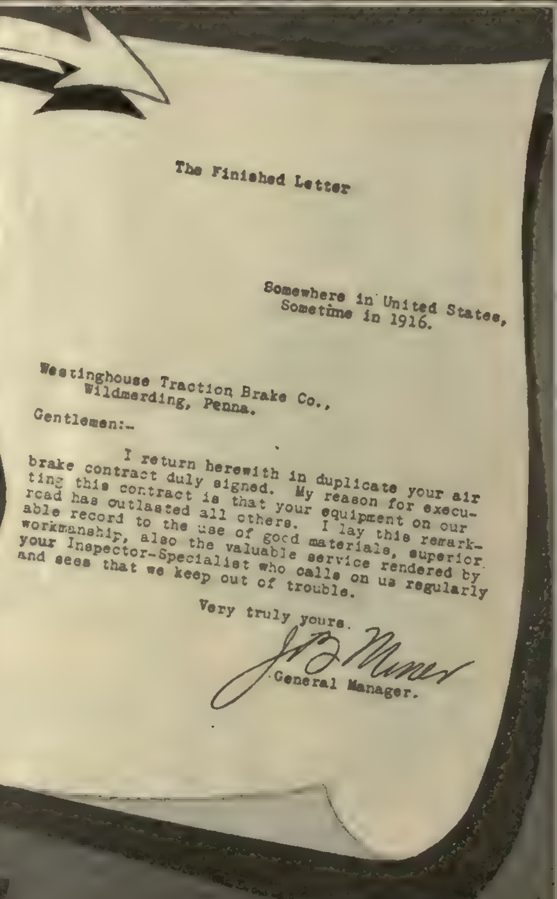

"Write a letter to the WESTINGHOUSE TRACTION BRAKE COMPANY and tell them why we signed their contract."



The Finished Letter

Somewhere in United States,
Sometime in 1916.

Westinghouse Traction Brake Co.,
Wildmerding, Penna.

Gentlemen:-

I return herewith in duplicate your air brake contract duly signed. My reason for executing this contract is that your equipment on our road has outlasted all others. I lay this remarkable record to the use of good materials, superior workmanship, also the valuable service rendered by your Inspector-Specialist who calls on us regularly and sees that we keep out of trouble.

Very truly yours.

J B Miner
General Manager.

This is one of a number of Westinghouse Air Compressors installed in June 1907, having made approximately 980000 miles, costing little for repairs, and is still running strong and efficiently. Best materials, superior workmanship and Inspector-Specialist Service did it.

Westinghouse Traction Brake Company

General Offices: Wilmerding, Pa.

PITTSBURGH:
Westinghouse Building
CHICAGO:
Railway Exchange Building

NEW YORK:
City Investing Building
ST. LOUIS:
[illegible]

The Choice of a Stoker
Always Narrows down to -
-A Study of Plant Requirements

WESTINGHOUSE ELECTRIC

This Time Underfeed:—

"Ah, back again," said the Sales Manager to Sam, the Stoker Expert, upon his return from York, Pa.

"Yes, and do you know I hated to leave that clean little town with its quaint ways. But I must say that that stoker job was an interesting one. Combination steam and hydroelectric plant. Remember our installation of twelve 7-Retorts down at Minneapolis?"

"Yes, Sam."

"Well, it sold this job. Conditions practically the same—steam plant to act as a standby, with fires banked, ready in case of accident or otherwise to take the entire load of the water power station in less than nine minutes. You can see that this requires a stoker of extraordinary overload capacity, and one which can rise to the emergency INSTANTLY. And I know of no stoker, of any type, that is more responsive than the Westinghouse Underfeed. Personally I have seen our stoker jump from a banked fire to 480% load in less than eight minutes."

"Well, Sam, it was plainly a case of Underfeed."

"Yes, and I know that this customer will be as satisfied with the Westinghouse Underfeeds as our Minneapolis friends."

Write for Stoker Circular 1559

Westinghouse Electric & Manufacturing Co.

EAST PITTSBURGH, PA.

Westinghouse

Phono-Electric

It Doesn't Break Unexpectedly

One of the reasons that led to the choice of Phono-Electric contact wire for the Philadelphia-Paoli electrification is its practical immunity from unanticipated breakage.

Because its uniform quality assures even wear, thus giving ample warning of the need for replacement.

Even the most carefully designed catenary suspension cannot take satisfactorily the shocks from current collectors on high-speed trains—

Unless the **contact** wire has the proper degree of ductility.

It is this ductility—this freedom from crystallization and breakage—that makes Phono-Electric logical for uninterrupted service whether that service is on

Electrified steam, interurban or city lines.

Bridgeport Brass Company

Bridgeport Connecticut

Backing Copper with Service

Although they are made from the purest commercial copper you get considerably more than that with O-B Bonds.

There is the unseen perfection which comes from skillful workmen operating up-to-date machinery.

There is the security which comes from exacting inspection and rigorous tests.

There is the ready assistance of a staff of Engineers, trained to dovetail bonds with service conditions.

So when you are ready to buy Bonds, remember O-B MORE-THAN-COPPER BONDS.

See Pages 466-567 of Catalog No. 16 for description of O-B Bonds and Tools.

The Ohio Brass Company
Mansfield, Ohio

Lines, Indianapolis Traction & Terminal Co., Indianapolis, Indiana. Michigan Street near Agnes

In Service 15 Years—
Good For Many More—
Carrying Tremendous Load—

Northern White Cedar Poles

Look at the load carried by these **Northern White Cedar Poles.**

Here is the data:

Lines of the Indianapolis Traction & Terminal Co., Indianapolis, Indiana.

Leads from the power house to points in various parts of the city of Indianapolis.

Photograph taken on Michigan Street near Agnes.

Line built of **Northern White Cedar Poles** 15 years ago. There have been no replacements. Poles were not treated. Poles are in good condition and indicate many years more of service.

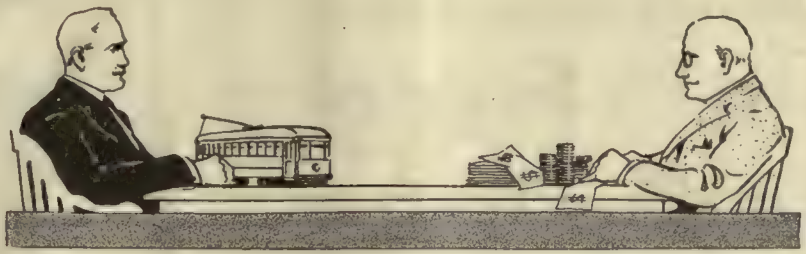
They carry 24 Feeder wires; eighteen of these are 500,000 C. M.; six are 1 million C. M.

Northern White Cedar Poles make the sturdy attractive line. They withstand great strain; offer great resistance to decay. They contain a large percentage of heartwood which adds strength. The large butts make for strength and stability.

Light in weight; low transportation and installation cost. Easily transported and erected. Non-conductors of electricity; the safe pole to work on.

Long Life—Low First Cost—Low Maintenance Cost

Northern White Cedar Association
Lumber Exchange—Minneapolis, Minn.



Financing an Improvement

Sane, sound sense is just as essential in railroading as in banking.

Your directors know that—they know, too, that any piece of equipment that will promote safety, or efficiency, or better relations with the public is, within reason, worth more than it costs.

But if they don't know that United States Electric Signals *do* promote safety, and efficiency, and better relations with the public—why, tell them!

If you don't, you're letting them—and yourself, too—in for a fearsome jolt when that expensive accident, that's sure to come, makes a mockery of your safety and efficiency and robs you of public confidence.

Penny-wisdom never made a big road out of a small one—go before your directors at the next meeting; tell them that *you*, and *they*, and the *public*, *need* the protection that can be given *only* by United States signals.

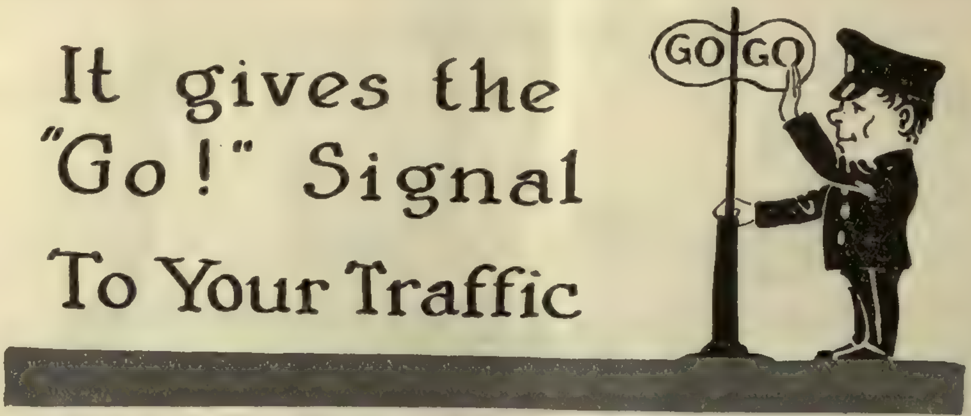
Ask us for a financial proposition that you can lay before the board.

United States Electric Signal Company

West Newton, Massachusetts

Representatives:

Western: Frank F. Bodler, Monadnock Bldg., San Francisco
Chicago: Warren Moore Osborn, McCormick Bldg.
Foreign: Forest City Electric Service Supply Company, Salford, Eng.

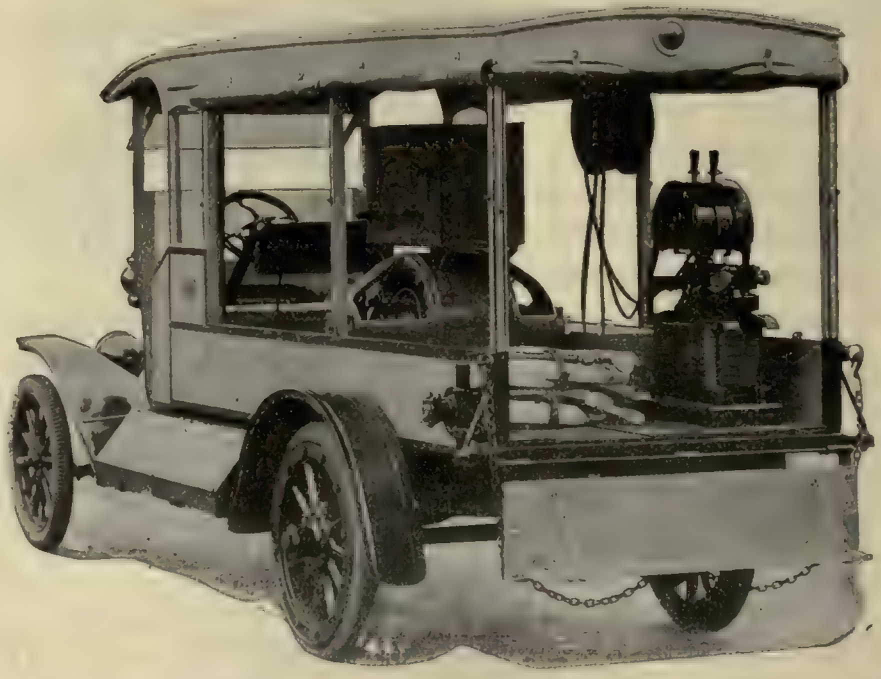


No more disruption of schedules while bonding work is in progress—your cars can run straight past the work, even while the welding clamps are on the rails, if you use a

Champion Bonding Truck

The Champion System saves rails, bonds, schedules, labor and therefore MONEY.

Write today for details



The Electric Railway Improvement Co.

Cleveland, Ohio

Compare this "Safety" Fixture with Bare Lamps

Made for Attractive Car Lighting
and Absolute Safety

The well established fact that brightly lighted cars produce greater returns than dull, dingy cars sells thousands of Safety Car Lighting Fixtures each year.

Good lighting these days is good advertising. It reflects prosperity, pleases the public and makes for attractiveness.

Safety Fixtures are standard the world over on account of their exclusive safety features. They are designed for use with various types and sizes of reflectors and lamps so that proper relation between the reflector and lamp is assured in any combination.

You will actually save money by using Safety Fixtures.

Write for our booklets giving complete information.

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Sts.

NEW YORK
50 Church St.

CHICAGO
Monadnock Bldg.

Canadian Distributors—Lyman Tube & Supply Co., Montreal, Toronto

Run Your Wheels Further Between Turnings By Using These Bearings

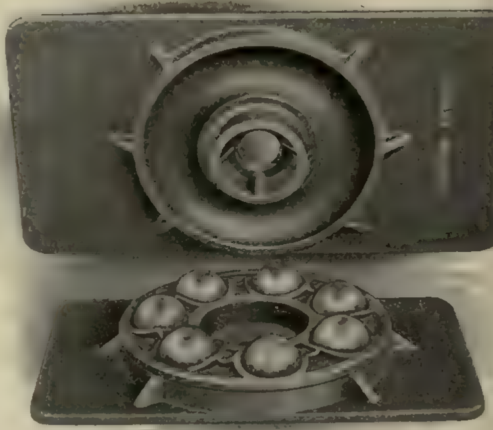
Length of wheel life depends largely on the number of turnings or grindings they will stand. Worn flanges are caused by grinding against the rails. If you reduce the flange pressure you reduce wear, lengthen the time between "pull-ins" and decrease maintenance cost.

An anti-friction center plate does not decrease flange wear because it permits the truck to slap from side to side. An ordinary friction plate is worse because it binds the truck and prevents the wheels from running free.

The Hartman centering center plate is not anti-friction because it offers resistance to truck turning and tends to keep it straight. But the wheel flange pressure resulting *is never as great as that produced by a friction plate.* Moreover, on leaving a curve this centering bearing straightens the truck without pressure on the wheel flanges.

Consequently wheels on a Hartman-equipped truck last longer, the trucks do not nose and power consumption on curves is less. The bearings are not lubricated, and the balls, 2⅛ inches in diameter, do not pit the raceways and carry the load on two-thirds of their circumference.

These bearings can be placed on nearly any truck, new or old, and are not expensive. Send for new catalogue.



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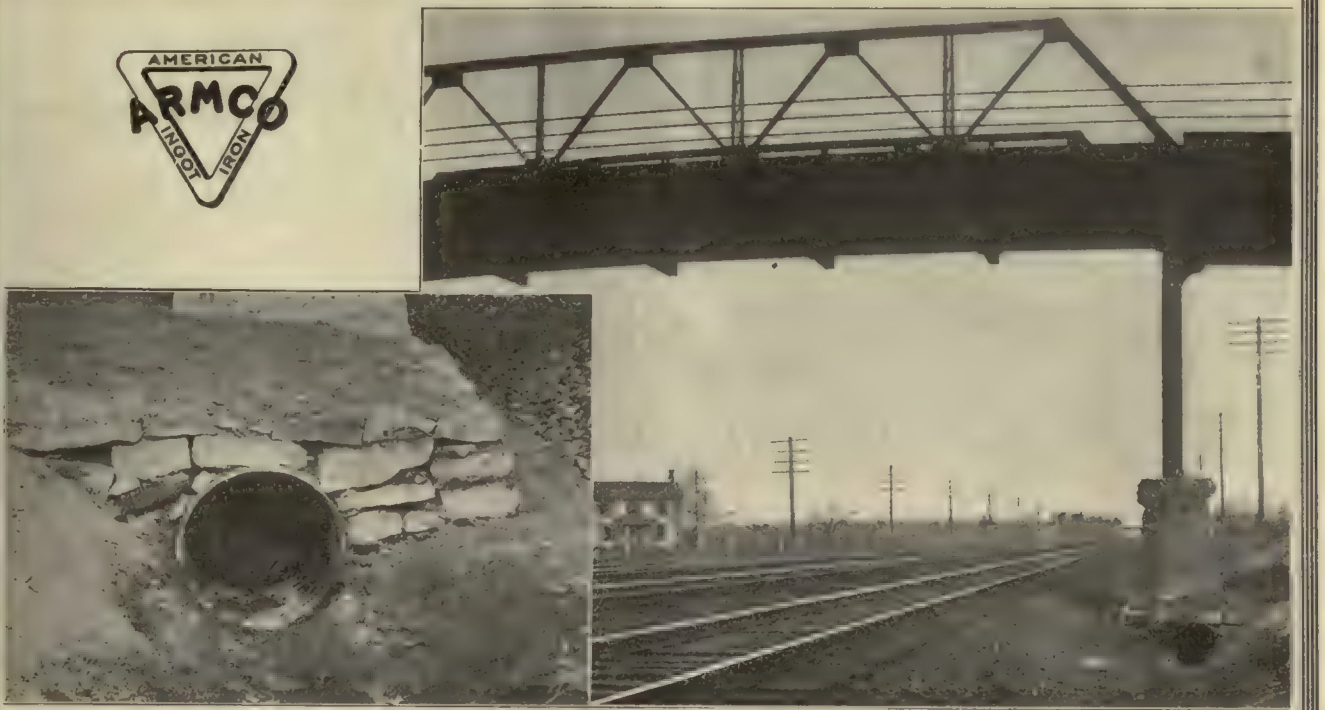
U. S. Metal & Mfg. Co., New York and Washington; Grayson Railway Supply Company, St. Louis; C. F. Saenger & Co., Cleveland; Brown & Hall Supply Co., St. Louis; C. E. A. Carr, Toronto; W. M. McClintock, St. Paul; Alfred Connor, Denver; O. H. Davidson Equipment Co., Salt Lake City; F. F. Bodler, San Francisco; S. I. Wailes, Los Angeles; W. F. McKenney, Portland, Ore.

AMERICAN ARMCO INGOT IRON



The above illustrated "Armco" Iron Culvert was installed by a great Eastern Railroad in 1911 and was recently inspected. Condition perfect.

The Iron of Grandfather's Day

resisted the attacks of time and weather because it possessed three qualities highly essential to durability—**purity, evenness, solidity.** These qualities are found, in still greater degree, in

"ARMCO" IRON

—and in this fact lies the reason for the long life of "Armco" Iron Corrugated Culverts. Railways large and small, all over the country, heartily endorse them because of their durability and their enormous strength and resiliency.

An "Armco" Iron Culvert is a reliable, enduring installation—not a temporary makeshift.

Write the nearest Manufacturer for particulars and prices on "Armco" Iron Culverts, Flumes, Plates, Sheets, Roofing and Formed Products

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Georgia, Atlanta
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Indiana, Crawfordsville
W. Q. O'Neall Co.
Iowa, Des Moines
Iowa Pure Iron Culvert Co.
Iowa, Independence
Independence Culvert Co.
Kansas, Topeka
The Road Supply & Metal Co.
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Michigan Bridge & Pipe Co.
Minnesota, Minneapolis
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Minnesota, Lyle
Lyle Corrugated Culvert Co.
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Corrugated Culvert Co.
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Danville Brick Company, Danville, Ill.
Clinton Paving Brick Company, Clinton, Ind.
Alton Brick Company, Alton, Ill.
Medal Paving Brick Co., Cleveland, Ohio.
  One plant at Cleveland, Ohio.
  One plant at Carrollton, Ohio.
  One plant at Malvern, Ohio.
  One plant at Wooster, Ohio.
Metropolitan Paving Brick Co., Canton, Ohio.
  Four plants at Canton, Ohio.
  One plant at Willow, Ohio.
Bessemer Limestone Co., Youngstown, Ohio.
  Three plants at Bessemer, Pa.
Peebles Paving Brick Co., Portsmouth, Ohio.
  Two plants at Portsmouth, Ohio.
  One plant at Firebrick, Ky.

Murphysboro Paving Brick Co., Murphysboro, Ill.
Southern Clay Mfg. Co., Chattanooga, Tenn.
  One plant at Robbins, Tenn.
  One plant at Coaldale, Ala.
  One plant at Birmingham, Ala.
McAvoy Vitrified Brick Co., Philadelphia, Pa.
  One plant at Perkiomen Junction, Pa.
Windsor Brick Company, Akron, Ohio.
Hocking Valley Brick Co., Columbus, Ohio.
  One plant at Logan, Ohio.
Veedersburg Paver Co., Veedersburg, Ind.
Springfield Paving Brick Co., Springfield, Ill.
Terre Haute Vitrified Brick Co., Terre Haute, Ind.
Albion Vitrified Brick Co., Albion, Ill.
Alliance Clay Products Co., Alliance, Ohio.
Westport Paving Brick Co., Baltimore, Md.
  One plant at Westport, Md.
The Mack Mfg. Co., New Cumberland, W. Va.
  Four plants at New Cumberland, W. Va.
The Hydraulic-Press Brick Co., St. Louis, Mo.
The Barr Clay Co., Streator, Ill.
Burton-Townsend Co., Zanesville, O. Two plants.

The Trimble Paving Brick Co., Dayton, Ohio.
  One plant at Trimble, Ohio.
  One plant at Glouster, Ohio.
The Thornton Fire Brick Co., Clarksburg, W. Va.
  One plant at Thornton, W. Va.
Indiana Paving Brick & Block Co., Brazil, Ind.
Standard Brick Co., Crawfordsville, Ind.
Shawmut Paving Brick Works, Shawmut, Pa.
The Pennsylvania Clay Co., Pittsburgh, Pa.
  One plant at Conway, Pa.
  One plant at Crows Run, Pa.
  One plant at Bradys Run, Pa.
Clydesdale Brick & Stone Co., Pittsburgh, Pa.
  Plant at Elwood City, Pa.
John Kline Brick Co., Wickliffe, Ohio.
Streator Clay Mfg. Co., Streator, Ill.
Martinsville Brick Co., Martinsville, Ind.
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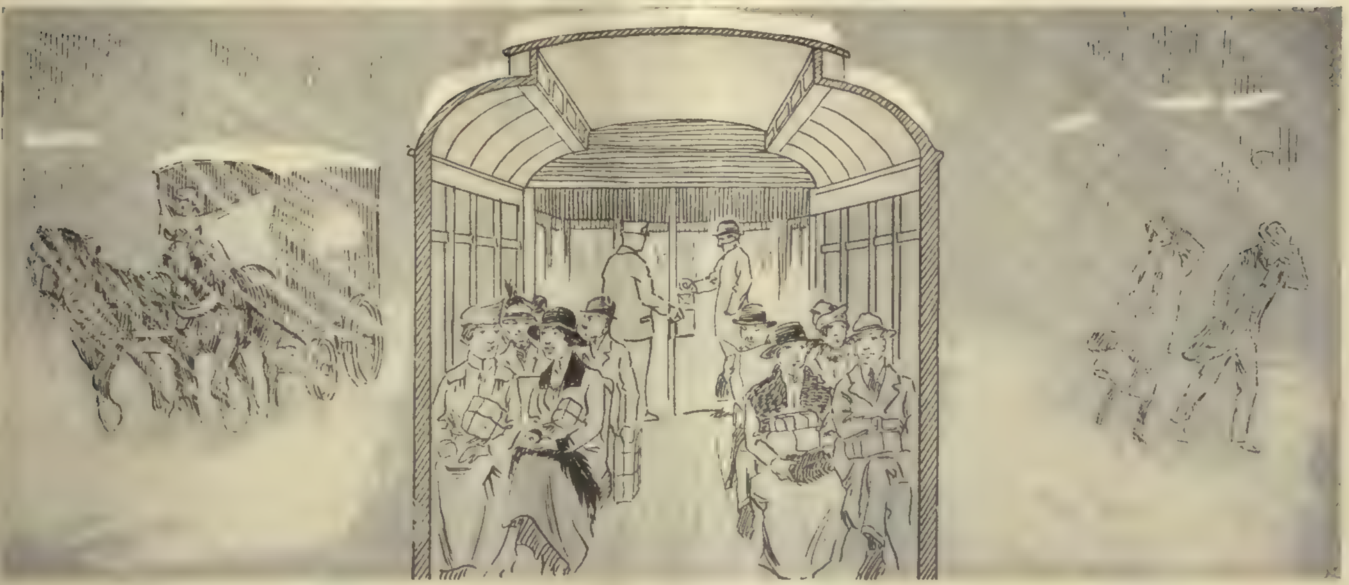

National Pneumatic Door and Step Control Was Adopted for 200 Remodeled Cars

by the Bay State Street Railway

To Promote Better Heating at Less Cost

The Bay State Street Railway adopted National Pneumatic door and step control—

1—To relieve its motormen and conductors from opening and closing doors up to 864 times within their nine-hour day.

2—To permit the conductor to concentrate on fare collection.

3—To conserve the life of the doors and the nerves of the passengers by eliminating slamming.

4—To cut down the time per stop by at least 2 seconds, and

5—TO KEEP MORE EVEN CAR TEMPERATURE.

The Bay State Street Railway found that when the doors of its non-bulkhead cars are opened the admission of air is twenty-six times greater than through monitor ventilators. By accelerating the opening and closing of doors, therefore, National Pneumatic equipment not only accelerates schedules but also permits a moderate expenditure of heating current to

Keep the Passengers Comfortable in Winter Weather

NATIONAL PNEUMATIC COMPANY

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Just ask for Bulletin Series 700-J.

Oxweld Acetylene Co.

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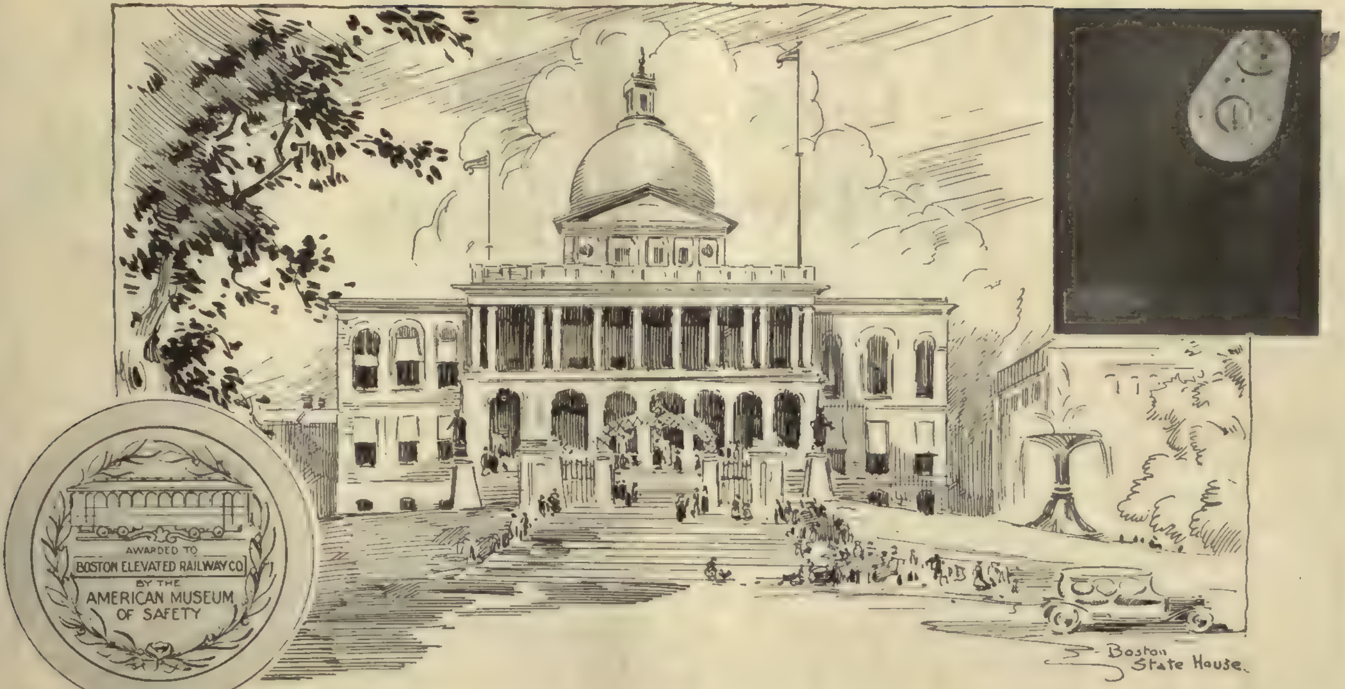
Largest Makers of Welding and Cutting Equipment and Supplies in the World



461 Rico Coasting Recorders in the Service of the Boston "L"

The Brady Safety Medal Road

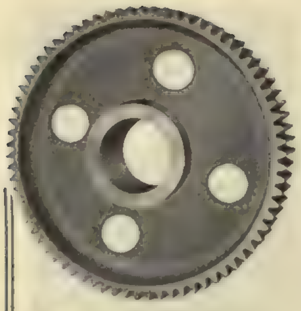
Early in 1916, the Boston Elevated Railway placed in service 419 Rico Coasting Recorders covering all its elevated and subway cars. With the purchase of more cars, this company ordered 42 additional Rico Recorders later in the year. Is it not significant that the Boston Elevated Railway, which holds the Brady Medal for Safety, should have adopted the Rico Coasting Recorder for its guide in securing better service at lower cost on all its rapid transit routes?

Like so many other great electric railway systems, the Boston Elevated Railway has concluded that exact knowledge of *coasting time* is

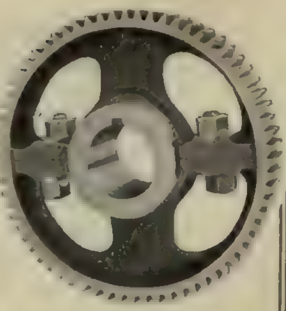
The True Principle for Measuring Operating Efficiency

Time is the Essence of Railroading

RAILWAY IMPROVEMENT CO. RICO 61 BROADWAY, NEW YORK



Grade B—Cast Steel Gear
(Solid Type)



Grade B—Cast Steel Gear
(Split Type)

Cast Steel Railway Gears

The General Electric Company is a pioneer manufacturer of cast steel railway gears. Having made the first electric railway motor in the United States, it is but natural that this company should have given early attention to the question of gears for this class of work.

Neither money nor effort has been spared to produce gears of unqualified excellence, with the result that the cast steel gears put out by the General Electric Company today are the superior of any cast gear on the market.

Types of G-E Cast Steel Gearing

Grade A—Untreated—split or solid—operates with Grade H or F pinion.

Grade B—Hardened and tempered by the Grade M Process—the only cast gear that will operate satisfactorily with the famous Grade M pinion—made in split and solid types.

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Grade L—Case-hardened—tooth structure consists of low carbon core with high carbon, hard wearing surface. Depth of case approximately one-sixth of tooth thickness at pitch line. Furnished in split or solid types. Operates with Grade K pinion.

Ask for our New Gear Bulletin, No. 44419

General Electric Company

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6664

Electric Railway Journal

Published by the McGraw Publishing Company Inc.
Consolidation of Street Railway Journal and Electric Railway Review

Vol. XLVIII NEW YORK, SATURDAY, DECEMBER 23, 1916 No. 26

HIGH COST OF LABOR IMPOSES NEW PROBLEMS

The higher the unit cost of labor the more important is the need for using it economically and supplementing it with mechanical devices. At present labor is probably more expensive than it has ever been before, and the chances for material reduction in its cost, at least in the near future, are not very bright. All who are responsible for the expenditure of labor must, therefore, consider most carefully every means for reducing it. In general, human labor is, considered purely as a matter of mechanics, very expensive. To illustrate, we may assume that by working continuously a man could not produce more than a kilowatt-hour per day, which if drawn from an electric circuit would cost the railway from 1 cent to 3 cents. It is true that the ancient Egyptians, Chinese and other peoples accomplished wonderful mechanical feats with human labor by employing armies of men. The Chinese, for example, were able to transport objects of great weight by means of elaborate wood framework which could be grasped by the requisite number of men. They were able thus to do the same kind and magnitude of work as is accomplished by a modern crane or derrick. In the early days, however, slave labor was very cheap, the time element in work was not seriously considered, and there were few devices for utilizing nature's stores of energy. With these primitive peoples low labor cost was coupled with a prohibitive cost of mechanical energy from other sources, whereas at the present time we have expensive labor and cheap energy.

REPLACING HUMAN LABOR WITH MACHINES

In any mechanical operation we pay for brains, manual skill and mechanical energy. These are utilized in varying amounts depending upon the nature of the operation and the intelligence with which the work is laid out. In this there is much to be learned from the manufacturers, who have long recognized the advantage of doing everything possible with the aid of machines. To be sure manufacturing is different from railway work, but wherever operations can be concentrated and standardized manufacturing conditions can be approximated. With the conviction that much more can be done on electric railway properties to reduce the consumption of labor, and thus offset the rising unit cost of labor and materials, the Electric Railway Journal has endeavored to bring out all possible information regarding labor reducing practices. An article by R. C. Cram appearing in this issue is an example. Mr. Cram shows how track and road materials can be handled most cheaply. The same principles apply in other departments. It is possible that the present shortage and high cost of labor, combined with the unsatisfactory character of much that is obtainable, will drive home the lesson that we have been buying very expensive energy in the past. If some of the money thus spent can be invested in skill and brains the result will be a good return and better working conditions for the men. Many a way engineer or master mechanic has asked for a machine or tool which he knew would save money only to be refused because first cost rather than ultimate saving influenced the decision. One lesson in all of this is that if the present organization of departments of the electric railway employing much labor is not conducive to the use of machinery, this organization should be changed if possible in the interest of economy.

STUDYING POWER ACCOUNTING

A. E. Dedrick, according to a C. E. R. A. A. paper on "Electric Light and Power Accounting," abstracted elsewhere this week, believes that electric railway accountants would be better officials for knowing about accounting methods in a field so closely connected with electric railways, and in this we concur. Such knowledge, of course, is essential for accountants of combined lighting and transportation companies. Knowledge of lighting and power accounting should also be sought by accountants of interurban lines that are adopting the plan of selling power to consumers along their routes. Only as a result of an intimate acquaintance with the principles of power cost accounting are the charges for such service likely to include a proper demand allowance covering the investment cost, as in the case of separate electric companies. Aside from its usefulness in such cases, however, a working acquaintanceship with the theory and practice of electric light and power accounting would be another excellent example of that wider vision that characterizes the modern accountant. The main reason for the rise of electric railway accountants to a position of vital importance in company organizations has been the fact that they have not been satisfied to remain mere bookkeeping clerks but have become students of finance, law, transportation and accounting and to some extent engineering. For the progressive accountants who are still seeking to broaden their knowledge, however, no better field could be found than the general accounting work of closely allied industries. The electric lighting and power field in particular is one of phenomenal growth and progressiveness, and many a hint as to improved methods and general efficiency might be found by the electric railway accountant who does not keep his interest narrowed down to the confines of his own field.

THE PLACE OF DEFINITENESS IN ASSOCIATION WORK In last week's issue of the Electric Railway Journal brief reference was made to the new organization of the executive committee of the Transportation & Traffic Association, under which committee work in groups will be supervised by members of that body. The essentials of this plan, which appears to us to be a very commendable one, are definiteness of object, plan and schedule on the one hand and provision for supervision on the other. Definiteness or concreteness of purpose is essential to success in any line of work, the first question to ask being: What are we striving to accomplish? Next in order is a concrete, intelligible and workable plan involving these questions: What is to be done? and When is it to be done? Given a definite object and a comprehensive plan, it is necessary to supplement this with effective supervision. Without such supervision any work is sure to suffer and particularly general work such as that of a national society. The work of the American Association has undoubtedly suffered in this particular in the past, and this was perfectly natural. Committee members are busy men; they would not have been selected for their responsibilities otherwise. Chairmanships are likely to be occupied by men busiest in the work by which they earn their daily bread. These men are accustomed to follow-up schemes in their business, and they expect and appreciate similar systems in association work. It is particularly appropriate that the Transportation & Traffic Association should promulgate a plan for more systematic committee work. The specialty of the transportation officer is schedule making and checking. Under the direction of President L. C. Bradley this association expects to set an example of thoroughness and promptness this year. Properly supported by the companies which have permitted themselves and their employees to be honored by committee appointments, the association cannot but have a profitable year's work.

A THOROUGHLY BAD BILL

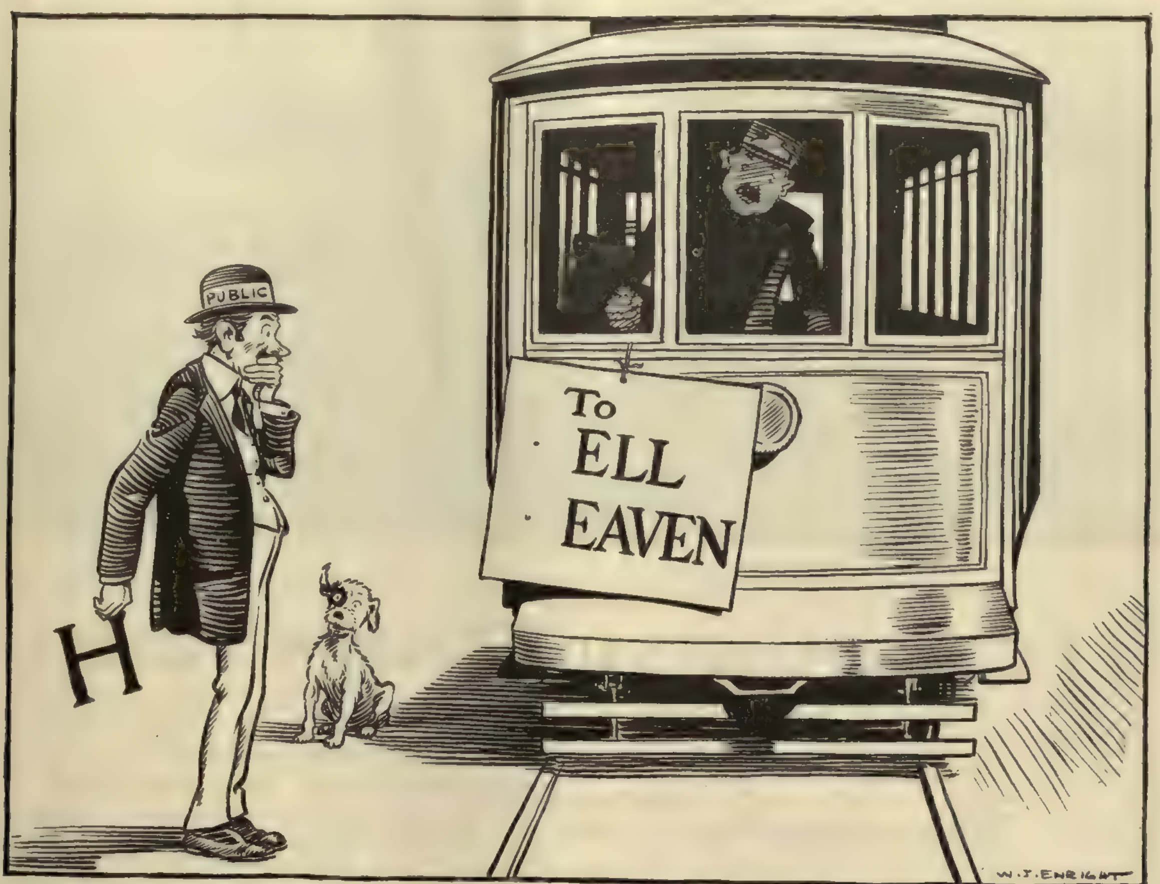
A serious tax upon the spread of intelligence and upon the extension of business efficiency in this country was proposed in Washington on Dec. 9, when the House committee on post-offices voted to include in the current post-office bill a rider which places second-class mail matter on the zone basis. The present second-class mail rate, as most of our readers know, is 1 cent a pound, but if the proposed change is made, this charge will apply only to the first 300 miles. For the next 300 miles the charge will be 2 cents a pound and the rate then increases by stages to 6 cents a pound, which is the charge for postage when the distance is more than 1,800 miles. This is an increase to subscribers living more than 1,800 miles from the place of publication of 5 cents a pound, and, in the case of the Electric Railway Journal, would mean for such subscriptions an increase in postage over that at present of from $2 to $2.50 each per year. As there is no increase to subscribers within the 300 mile zone it is obvious that the effect of the added clause will be confined almost entirely to publications of country-wide circulation such as the national literary and scientific reviews, the proceedings of the technical associations and the business papers like this journal which are devoted to the effort of increasing business efficiency in some selected industry. The daily papers will hardly be affected partly because most of them use other means of distribution than by mail and partly because the greater part of their circulations, especially of the small papers, is within the proposed 300-mile limit.

Now there are very serious objections both to the discriminations thus made between publications of different character and to the unscientific rate of charges adopted. One of these objections is that the tax is laid upon the very class of periodicals which it should be the purpose of the national government to foster. The engineer, the physician, or the railway manager, who is distant from the large centers of population and supply, is handicapped sufficiently by being out of personal touch with the progress made in his line of work and should not be obliged to pay more for the information which will lead to higher professional skill or greater business efficiency than those more favorably situated. Again, the proposed plan tends toward sectionalizing the intelligence and thought of the country and defeating the spirit of unity in national affairs and uniformity in progress in material affairs which the federal government above all should stimulate. The principle here is entirely different from that in the parcel post charges. In that instance, a uniform postal rate for distance might enable the big mail-order houses in the larger cities to compete very seriously with the smaller distributing houses in local centers. The national periodicals, however, from the very nature of things, must always be published in the large centers of population and for that reason there is no small dealer to protect.

Another defect in the bill, as will immediately be recognized by all transportation men, is the unscientific nature of the proposed charge. It is based on the theory that the cost of mail transportation varies with the distance traveled and ignores entirely all terminal charges. Actually, when mail in New York is placed in a pouch marked San Francisco it probably has to be handled no more times or sorted than if it had been sent from New York to Hackensack, N. J., or to any other point within the 300 mile limit, and it is the sorting and distribution of mail rather than its actual transportation after it is placed on the railroad train that is expensive. In this respect the proposed bill differs from the parcel post law, which recognizes a terminal charge.

Altogether the bill is about as bad as any which has ever been seriously proposed for our postal service, and it has not even got the redeeming feature that it might be considered necessary to eliminate a deficit, because Postmaster-General Burleson, within a few days, has reported that his department had earned a surplus during the last fiscal year. Those subscribers to this paper who would be affected by the proposed bill can well make their protest heard in Washington.

What Does the H in Your Name Stand For?



For Heaven's Sake Tell Him Where to Put the H

WHAT is the public attitude toward the electric railway company in your town? Is it friendly, unfriendly or indifferent?

When a controvery arises affecting the railway's interests where does the public (knowing little or nothing about the merits of the case) usually stand?

All of us hear of people and institutions that we don't like and about which we are willing to believe the worst.

Then we get to know these people and institutions and find to our surprise that they are not so bad after all.

This sort of thing is due largely to lack of knowledge and partly to that inclination of the human mind illustrated in that story about "Gath."

George Alfred Townsend told a ministerial dinner companion that the first three letters of his pen name were his initials and that the H stood for where he was going.

"Oh, don't say that!" the clergyman exclaimed. "Heaven is within reach of all."

"Gath" once said that he had tried this psychological experiment on 4000 people, of whom 3996 thought that his H prophesied a hot destination.

Why the clergyman and 999 men out of every 1000 should jump to the conclusion that the H stood for hell rather than heaven is more or less of a mystery.

But as we know that this is merely the manifestation of a general tendency, it becomes necessary to replace ignorance with information and to tell people that the H in our name, strange as it may seem, stands for heaven.

Otherwise they will go on involuntarily putting it in front of 'ell instead of 'eaven, although it is before the latter (let us hope) that it really belongs.

Any railroad man with the imagination of a mudturtle can apply all this to his problems without further directions.

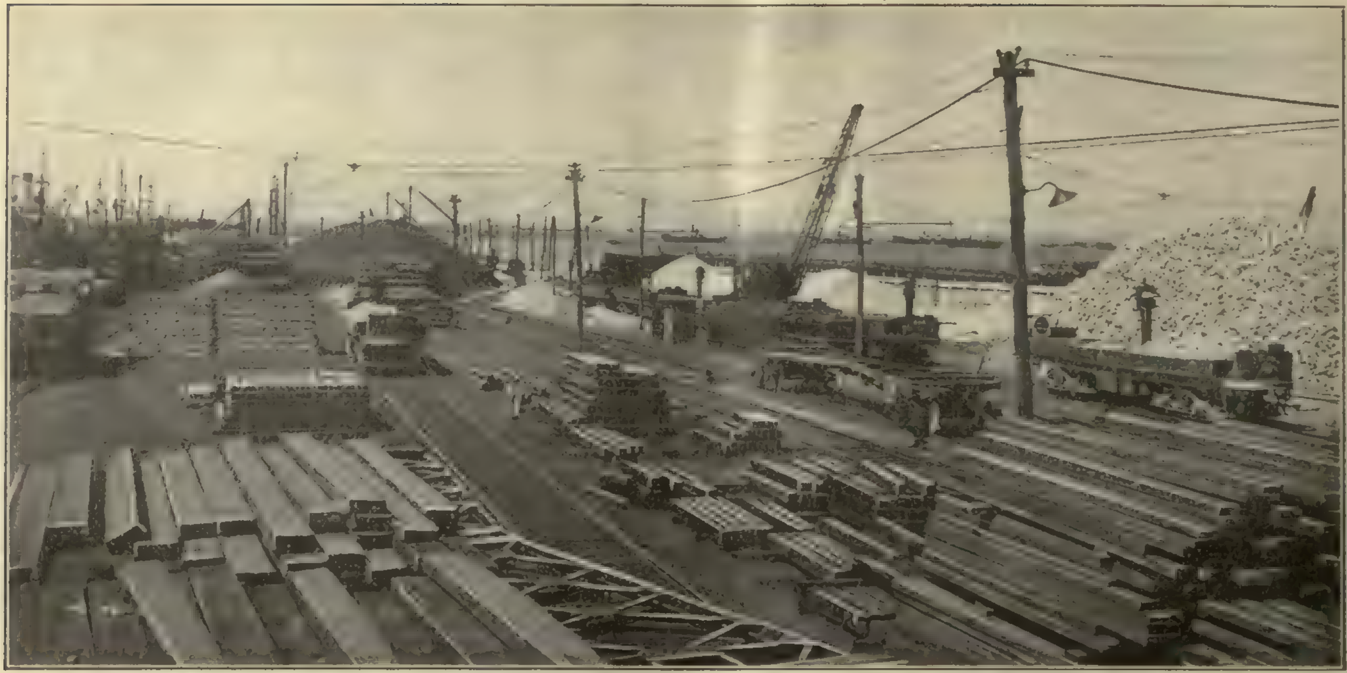
IGNORANCE is the cause of misunderstanding and distrust.

Add to this the inclination of the human mind unconsciously to think the WORST rather than the BEST.

And the need to put strong foundations of knowledge under popular opinion about public utilities is too plain to be postponed.

The kind of mason who does this foundation work best is known in the trade as a publicity man.

If his employment is too long postponed the whole house sometimes falls down under the weight of public disapproval.



STORAGE YARDS—FIG. 1—GENERAL VIEW IN SIXTY-THIRD STREET DOCK STORAGE YARD, B. R. T. SYSTEM

Cutting Costs in Storage Yards

Use of Yard Machinery Conduces to Reduction in Cost of Handling Rails, Ties, Paving Material, Etc.

By R. C. CRAM

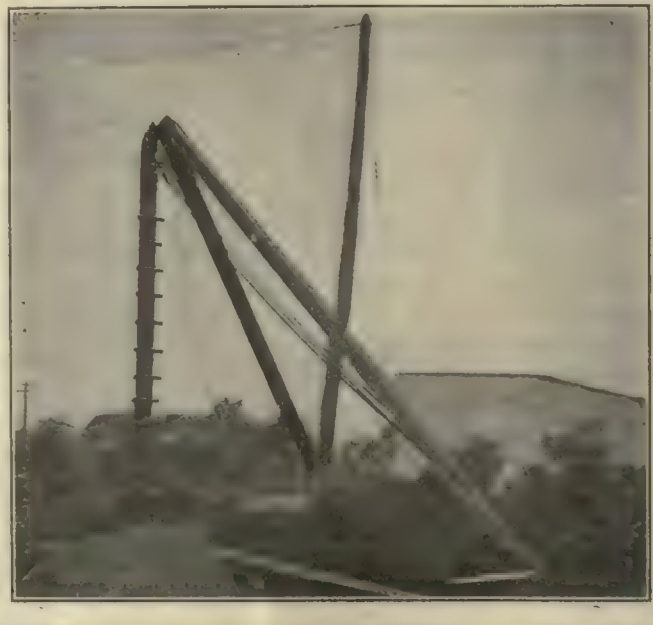
Assistant Engineer Way & Structure Department, Brooklyn Rapid Transit System

THE storage yard itself plays an important part in the consideration which should be given to the general subject of cost for handling and storing materials. It should be big enough to permit the purchase and storage of large quantities of materials in advance of actual need, thus allowing time for buying under suitable specifications and guarding against delays due to shortage of materials, to say nothing of the price savings usually effected through buying in bulk.

The location of the yard requires a careful study. In general it should be as nearly central to the system as practicable after proper weight is given to the factors of steam railroad and water connections and value of real estate. The latter item should not be allowed to control the selection of the site in most cases because the lack of proper rail and water connections to facilitate immediate storage will soon offset even very high real estate charges by the extra costs due to secondary hauling charges.

The arrangement of the yard, with respect to location of tracks and the location of the several materials so as to reduce handling to a minimum, should also have close attention. The need for machinery in yards is quite apparent, but it may not be out of place to emphasize this by referring to the following table of approximate quantities of certain materials handled in 1914 for surface track reconstruction in the Sixty-third Street dock storage yard of the Brooklyn Rapid Transit System.

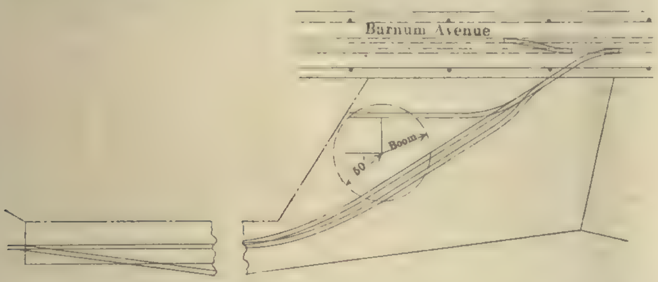
Material	Tons
Granite paving blocks	27,600
Standard yellow pine ties	2,540
Paving gravel	17,700
Grooved girder rail	3,400
Total	51,240



STORAGE YARDS—FIG. 2—STIFF-LEG DERRICK IN STORAGE YARD OF CONNECTICUT COMPANY, BRIDGEPORT, CONN.

There is now a general tendency to equip yards with labor-saving devices, chief among which are the various types of cranes in use for piling, hauling and storing bulky materials. There are four types of cranes which may be used for this purpose, *viz.*, stiff-leg derricks, guy derricks, jib cranes and gantry cranes. The stiff-leg type is the one in most general use, and one or more of these will be found almost indispensable in yards of all but the smallest roads, as the operation is simple, the range of use greater and the cost nominal in proportion to its serviceability. Such a derrick as that shown in

Fig. 2, which has a capacity of 10 tons, can be made and erected complete without motors for about $500. This includes labor and all fittings. This is a stiff-leg derrick located in a moderate-sized yard, the Summerfield yard of the Connecticut Company at Bridgeport, Conn. It is operated by means of a motor car, hence no other hoisting machinery is required with the derrick itself. The use of the motor car obviates the necessity for the purchase and maintenance of hoisting apparatus. A general plan of the layout of this yard with its steam road connection is shown in Fig. 3. Figs. 2 and 3 are from a photograph and a drawing furnished by W. R. Dunham, Jr., engineer maintenance of way of The Connecticut Company. A 15-ton wooden stiff-leg derrick with iron fittings, the general details of which are shown in Fig. 4, is said to have cost as follows in 1913: Lumber, $256.23; irons, $213.52; paint, $3, and labor, $35.25, a total of $508.

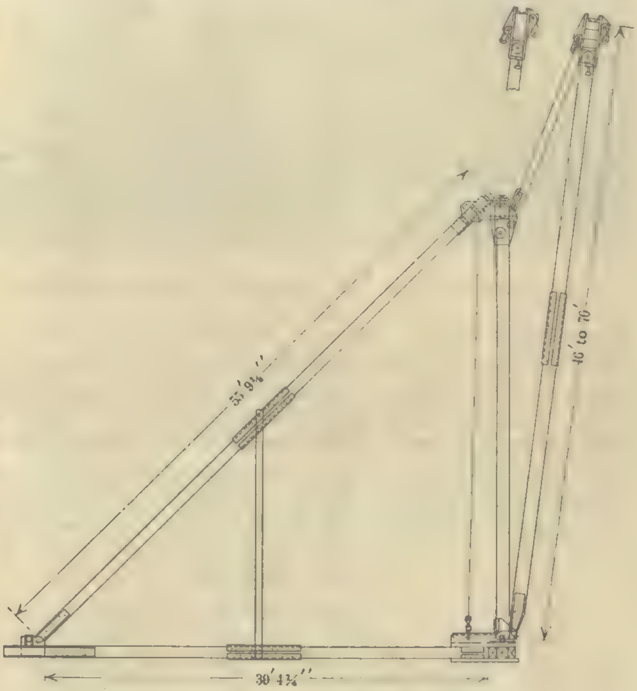


STORAGE YARDS—FIG. 3—SMALL STORAGE YARD OF CONNECTICUT COMPANY, BRIDGEPORT, SHOWING TRACK CONNECTIONS

When space is limited the knee type of stiff-leg derrick can be used to advantage. This is illustrated in Fig. 6 which shows a wooden derrick of this type used by the Brooklyn Rapid Transit Company. Fig. 8 is a design, of knee-type full-circle derrick, built by the G. H. Williams Company, Cleveland, Ohio.

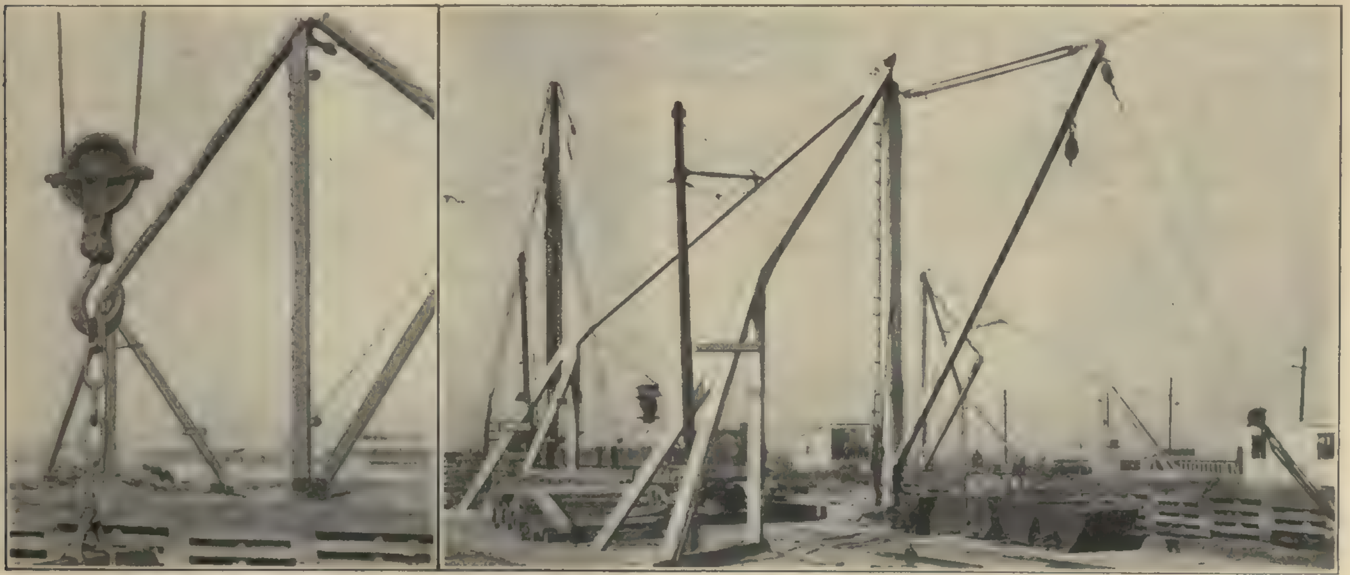
The guy type may be favored where conditions require the maximum range of action. A guy derrick is shown in Fig. 7. The location is such that ample head room for cars and wire is obtained under the guys. Unless sufficient area is available for properly locating the guys to provide such clearances, this type of derrick becomes less useful than the stiff-leg type. The illustration shows a guy derrick in use at a girder-rail storage pile. Its particular location in a large storage yard is shown in Fig. 10, which is a general layout of the yard track and derricks of the Sixty-third Street dock storage yard of the Brooklyn Rapid Transit System. In the drawing small arrows marked respectively *A*, *B* and *C* are given to show the points from which the accompanying photographs were taken.

The jib crane will be found useful where it is desired to transfer loads in large bulk from one car to another, or for use in a fixed position at a rail pile, especially where ground space required for derrick legs and sills or for guys is at a premium. Such a crane is shown in Fig. 11. It will be noted that this outfit is quite similar to that now coming into favor for use upon crane cars, although the one illustrated is very much larger in capacity.



STORAGE YARDS—FIG. 4—FIFTEEN-TON STIFF-LEG WOODEN DERRICK WITH IRON FITTINGS

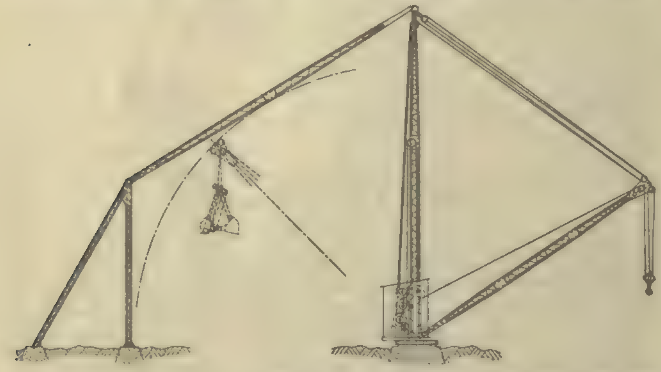
The gantry crane has had a limited use in yard work owing to the interference of overhead wires, and the writer is aware of only one important installation of



STORAGE YARDS—FIG. 5—SAFETY HOOK USED IN B. R. T. YARD; FIG. 6—KNEE-TYPE STIFF-LEG DERRICK

STORAGE YARDS—FIG. 7—FULL-CIRCLE GUY-TYPE DERRICK

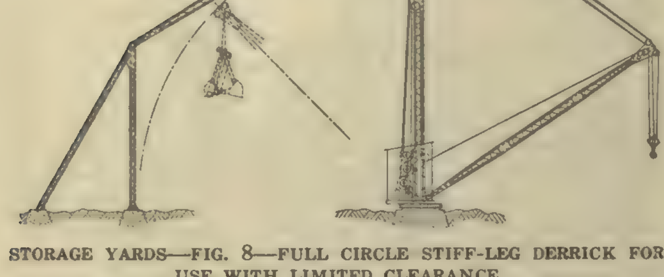
this kind on electric railway property. It is probable, however, that by the use of long cables or some other means of getting power to the cars and eliminating the wires, the advantages of this type of crane could be made more available. The installation referred to is that of the Cleveland Railway Company at its Harvard Avenue shops, which is shown in Fig. 12, made from a photograph furnished by E. M. T. Ryder, engineer maintenance of way Third Avenue Railway System, New York City.



STORAGE YARDS—FIG. 8—FULL CIRCLE STIFF-LEG DERRICK FOR USE WITH LIMITED CLEARANCE

The type of traveling crane running on elevated rails, such as is used ordinarily in shops and power stations, should be applicable to this field. Fig. 13 shows a yard of the D., L. & W. Railroad so equipped, using a Cutler-Hammer electro lifting magnet in addition to a clam-shell bucket.

The derrick car or locomotive crane also has a very wide use for handling materials in yards, and when equipped with the various buckets and devices for handling different materials, there is no doubt but that such a car alone will serve almost any purpose in a comparatively small yard and will be available also for occasional use upon the road away from the yard. Fig. 14 shows a locomotive crane of the Chicago Surface Lines, handling gravel. It is from a photograph also furnished by Mr. Ryder. For yard use only it is probable that a derrick car of the boom-crane type has the greatest range of use, while for combined yard and road use the jib-crane type will be found best. The one particular advantage of the latter in road work is the non-interference with overhead work. A typical jib-type crane is shown in Fig. 9. Both types are, of course, designed for electrical operation. These equipments cost from $6,000 to $7,000 complete, ready to run.

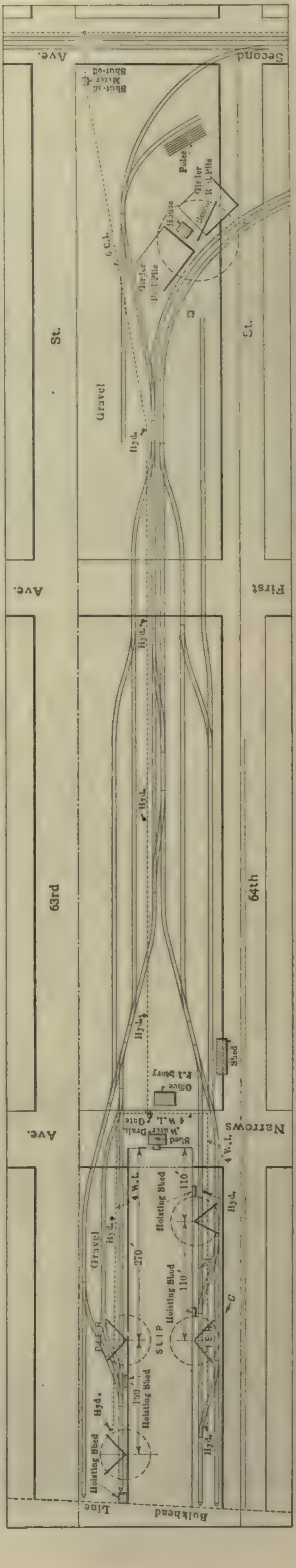


STORAGE YARDS—FIG. 9—JIB CRANE MOUNTED ON WORK CAR

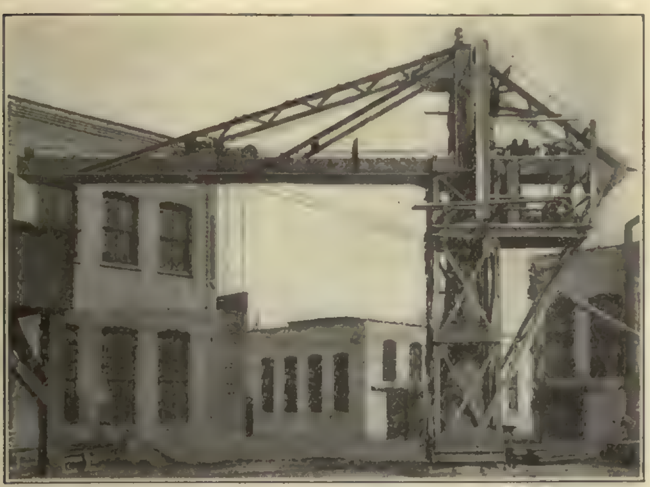
From the table it is evident that the crane has saved more than $2,200 per year, and therefore paid for itself in a little more than three years. A crane of the boom type has been found to save its cost in one year as compared with manual labor.

AUXILIARY DEVICES

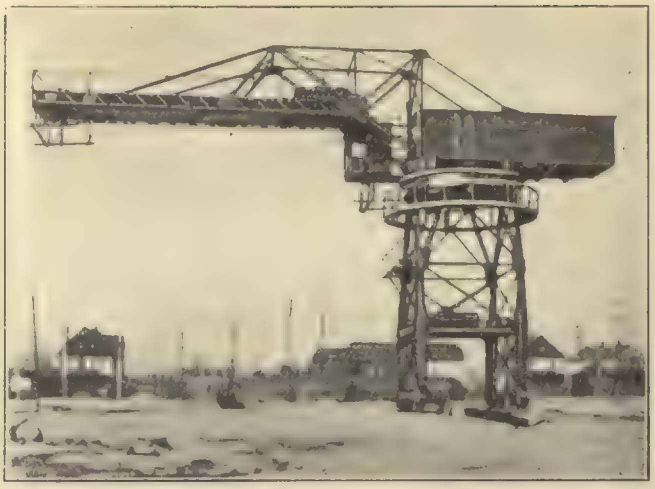
In conjunction with the use of cranes in yards there is a device in use for handling ties with the crane at the Sixty-third Street dock of the Brooklyn Rapid Transit system which reduced the cost of handling from 1 cent to 3 mills per tie, incidentally reducing the handling force from a crew of nine men and one foreman to two men and a crane operator. There has



STORAGE YARDS—FIG. 10—GENERAL LAYOUT OF SIXTY-THIRD STREET DOCK STORAGE YARD, BROOKLYN RAPID TRANSIT SYSTEM



STORAGE YARDS—FIG. 11—JIB CRANE FOR USE WITH LIMITED CLEARANCE



STORAGE YARDS—FIG. 12—FULL-CIRCLE, HAMMER-HEAD SWING CRANE

also been a great reduction in accidents and the ties may be piled much higher, thus saving ground space. The device, which is shown in Figs. 15 and 17, was designed by John Ferguson, dock master South Brooklyn Railway. The cost of these tie-bales is between $50 and $60 each.

Another saving effected through the use of machinery has been made in the handling of granite paving blocks. It was found that handling the blocks entirely by hand cost 22 cents per ton, which has been reduced to 7 cents per ton with the aid of machinery.

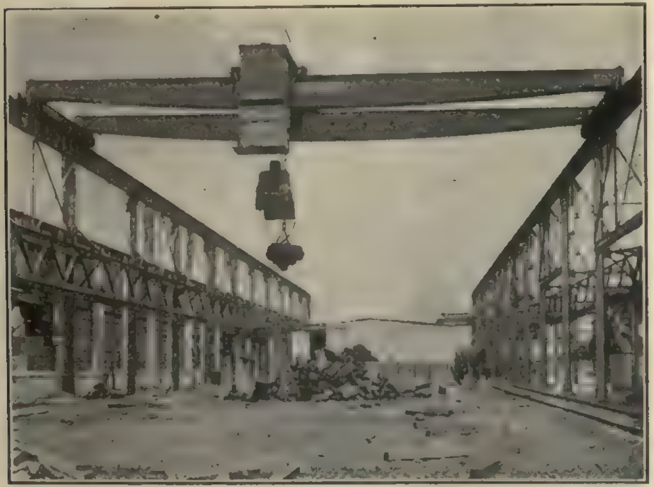
With respect to reduction in accidents, attention is directed to the safety hook shown in Fig. 5, page 1285, designed for use with derricks. This hook was also designed by Mr. Ferguson, after a fatality had directed forceful consideration to the need for such a device. It is practically impossible to detach the ring from this hook without deliberate intent. With the ordinary hook a sudden release of load on the fall lines or the fouling of the load in one of several ways would release the ring from the hook, thus creating a constant accident hazard which has been eliminated by the safety hook.

SAVING EFFECTED IN FOUR YEARS BY USE OF 3-TON PILLAR CRANE CAR ON ELECTRIC RAILWAY SYSTEM

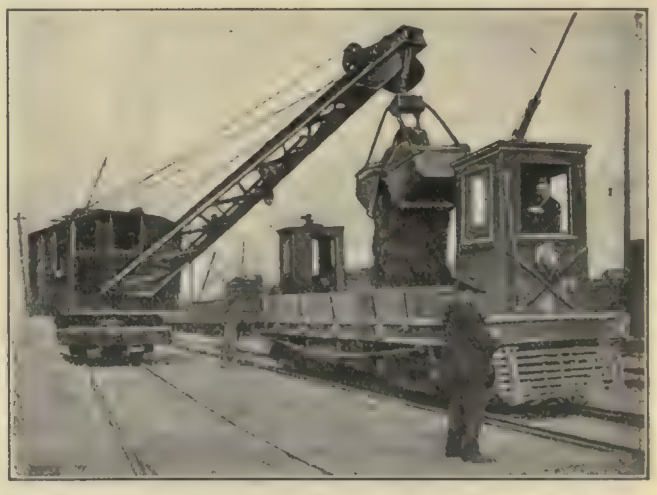
		Cost of Handling		
Number of Tons Handled		Without Crane	With Crane	Total Saving
4000 tons miscellaneous		$1.00	$0.25	$3,000.00
3324 tons load on cars		.75	.20	1,828.20
3324 tons to yard		1.00	.25	2,493.00
6340 tons unloaded		.50	.20	1,902.00
6340 tons to job		.75	.25	3,170.00
				$12,393.20
Cost of crane car, ready to run	$7,000			
Depreciation 5 per cent, four years	1,400			
Interest 5 per cent, four years	1,400			
Upkeep 2½ per cent, four years	700			
				$3,500.00
Net saving four years, one car				$8,893.20

Among the devices coming into use in lifting iron and steel about the yards is the electromagnet. One of these has already been referred to. Figs. 18 and 19 are from photographs furnished by E. H. Berry, engineer of roadway, Cincinnati Traction Company. These show the application to the handling of special work and scrap, respectively. This company has found the magnet very serviceable. This particular magnet was made by the Browning Engineering Company of Cleveland, Ohio, whose crane and grab bucket are also included in the Cincinnati equipment.

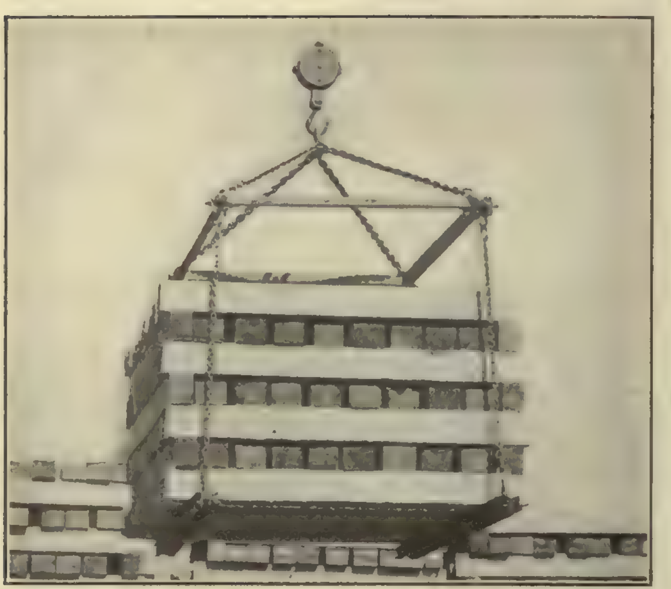
Another item of yard equipment found in some yards is the stone crusher, generally constructed in the portable type, such as that shown in Fig. 16, for convenience on occasions when it may be found advisable to have the outfit out on the work in order to lessen haulage charges. Where the cost of stone or gravel is high, it may be found advantageous to install stone crushers for producing ballast, and concreting material from old cobble granite and brick pavements or from old concrete. However, the installation of a crusher plant must be carefully considered because the maintenance, repairs and renewals of parts are expensive.



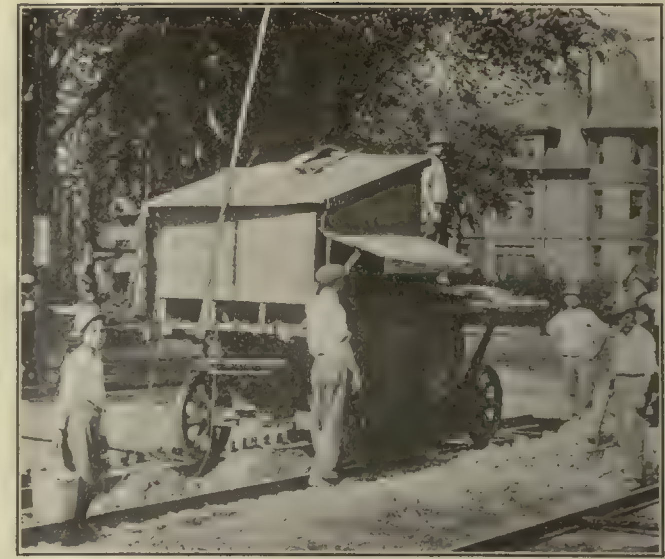
STORAGE YARDS—FIG. 13—OUTDOOR CRANE USED IN STOCKYARD OF D., L. & W. RAILROAD WHICH MIGHT BE APPLICABLE TO ELECTRIC RAILWAY YARDS



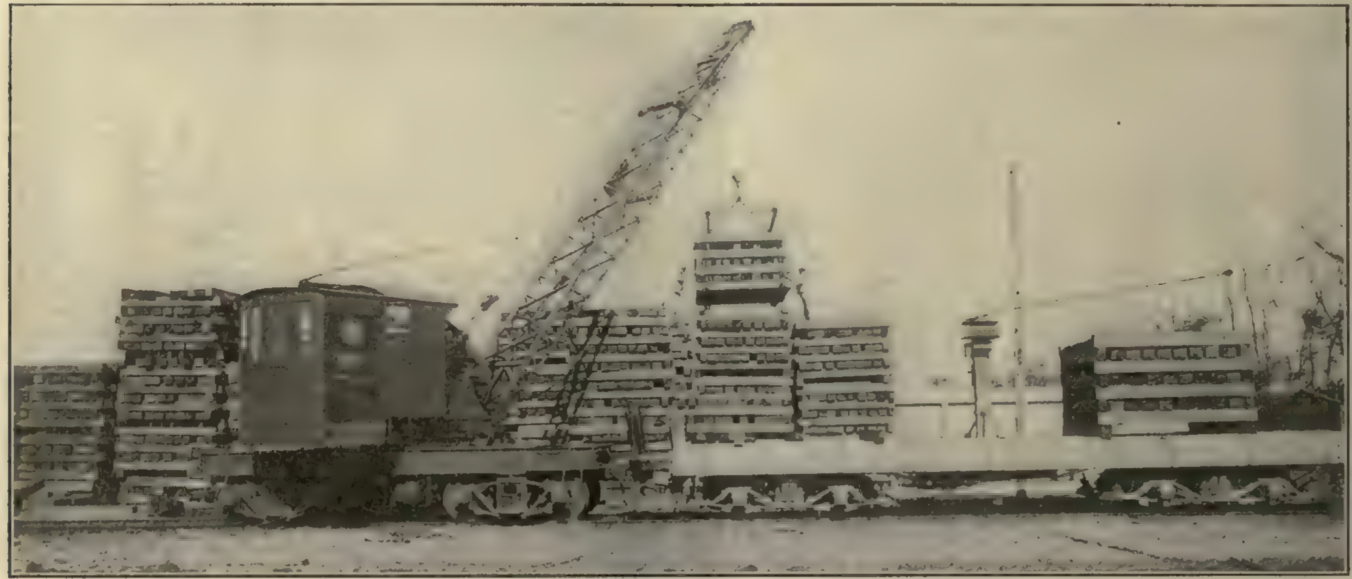
STORAGE YARDS—FIG. 14—LOCOMOTIVE CRANE USED ON CHICAGO SURFACE LINES FOR LOADING GRAVEL ONTO FLAT CARS



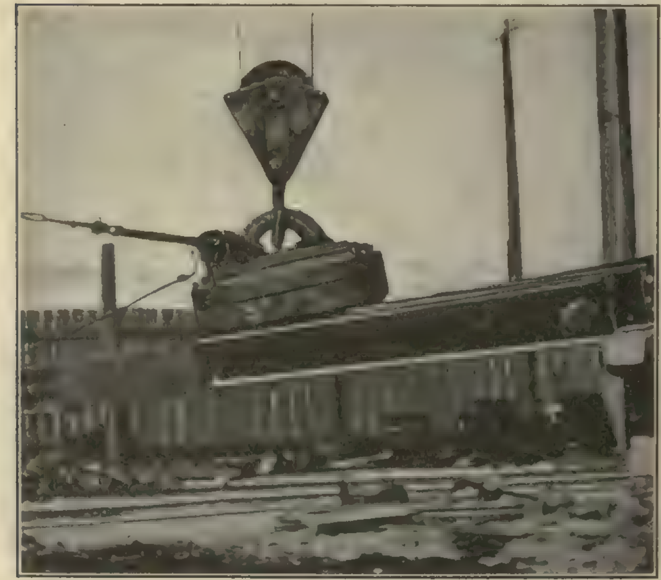
STORAGE YARDS—FIG. 15—CLOSE VIEW OF BALE AND LOAD OF TIES, B. R. T. STORAGE YARD



STORAGE YARDS—FIG. 16—PORTABLE STONE CRUSHER IN OPERATION ON STREET IN ROCHESTER, N. Y.



STORAGE YARDS—FIG. 17—LOCOMOTIVE CRANE IN USE IN GENERAL STORE YARD B. R. T. SYSTEM



STORAGE YARDS—FIG. 18—ELECTROMAGNET USED BY CINCINNATI TRACTION COMPANY, LIFTING SPECIAL WORK

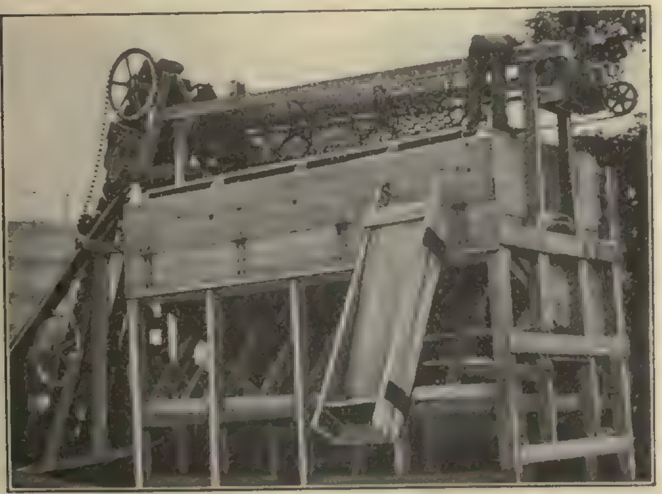
STORAGE YARDS—FIG. 19—ELECTROMAGNET USED BY CINCINNATI TRACTION COMPANY, LIFTING SCRAP MATERIAL

STORAGE YARDS—FIG. 20—STONE CRUSHER IN USE IN YARD OF NEW YORK STATE RAILWAYS, ROCHESTER, N. Y.

The plant is apt to be idle for quite long periods and if the average haul to and from the plant is too long, these factors, combined with operating and maintenance costs, will probably offset other savings to such an extent that it may even be found cheaper to purchase new ballast and concreting materials. Sometimes, where the operation of the plant by the railroad company does not appear economical it may be advantageous to allow an outside contractor to erect a plant at the yard and deliver all of the company's old paving material to him for crushing at a fixed rate based upon a price per cubic yard of crushed material produced. This method effects a salvage for otherwise useless material and the arrangement can be made to profit the contractor because he can also secure supplies from other sources which will keep the plant in practically continuous operation.

Figs. 20 and 21 show a stone crusher in service in the yard of the New York State Railways at Rochester, N. Y. They are from photographs furnished by D. P. Falconer, engineer maintenance of way Rochester lines.

An important part of a storage yard equipment, although it may not be considered as strictly yard machinery, is the track scale. No general yard of any size to-day should be without one, as there are so many bulky materials which require weighing as the most effective method of accounting for the loss materials such as sand, gravel, crushed and paving blocks.



STORAGE YARDS—FIG. 21—CLOSE VIEW OF STONE CRUSHER USED BY NEW YORK STATE RAILWAYS, ROCHESTER, N. Y.

Efficiency and Habit of Mind

Instances Are Given of the Savings Possible in Corporation Expenditures When an Economical Habit of Mind Has Been Developed

BY MAJ.-GEN. WILLIAM A. BANCROFT
Chairman Board of Directors, Boston Elevated Railway

IN response to your request for my views upon what might be denominated the psychology of efficiency, the following points appear to me of general interest to electric railways at this time.

In the effort to obtain additional net revenue, electric railways are obliged to practice in the conduct of their affairs the most rigid economy consistent with safe and adequate service. Apart from perfunctory economies there are many ways in which this object may be sought. Latent possibilities exist in the mental attitude of employees toward economy, and the cultivation of a habit of mind favorable to efficient practices is more important than is generally realized.

Every large company employs a considerable number of highly paid and capable persons, whose talents should be able to create more favorable conditions. Operating costs may be too high and revenues too low, in which case every opportunity should be sought to reap the benefits of such minds, encouraging by reason of their intelligence and cleverness such suggestions as will either reduce expense or increase revenue without expense, or do both. Naturally a man's thoughts relate to the particular service in which he is engaged, but in some other branch he may discover an opportunity to add to the company's net revenue.

By planning to have every man working to advantage and so far as possible eliminating waits, as in drawing pay, much can be done to realize the benefits of higher efficiency in the minds of executives of every rank. Fewer people can accomplish a given result if kept busy. A saving may be effected if provision is made so that equipment and tools will last longer and if work is done promptly instead of being put off. The development of new business is another subject worthy of study from the economic standpoint if accompanied by a habit of mind which separates costly from profitable results.

Before the present necessities for closer economy arose, it did not appear necessary in considering a thing to pay much attention to the cost of incidentals, such as stationery, typewriting, telephoning and traveling expense. A complete change in the habit of mind when regarding these matters has become essential. In the past it has not been sufficiently considered, for example, whether the main purpose could not be accomplished without expenditure, or, at most, with only small expenditures. Correspondence can be cut down to the great advantage of all in companies where the economical habit of mind toward incidentals has not been well developed. In other words, the habit of mind has been to consider the main object sought, not its cost, nor even the incidental cost of consideration and study, much less whether the object could be gained with no outlay whatever.

Not enough has been made of existing resources.

This habit of mind must be changed and consideration given to all expenditure, whether small or large. Ingenuity must be exercised, and ways of accomplishment found that will involve little or no expense. Plenty of instances have occurred where this has been done; enough to warrant the belief that it can be done in many other instances. In our own company, the articulated car and the pavement plow are representative illustrations.

Aside from the possibilities in rolling stock, track and buildings, the efficient habit of mind includes such matters as abstaining from ordering new stationery if old can be made to answer; avoiding hiring an outside stenographer when one's own can be utilized; refraining from using company stationery and postage stamps for private purposes and from ordering new filing cases, furniture, utensils, etc., when the existing equipment will satisfactorily answer the purpose.

In short, the efficient habit of mind constantly seeks the avoidance of waste both in material and effort and strives to reduce expenses both in small and large matters by the use of the inventive faculties.

Insurance and Publicity Discussed

One Session of Pennsylvania Street Railway Association Was Devoted to Papers on Fire, Life and Accident Insurance, and Publicity

In connection with the proceedings of the convention of the Pennsylvania Street Railway Association, held in Philadelphia on Dec. 12-13, the ELECTRIC RAILWAY JOURNAL published in the issue of Dec. 16 the various papers on lightning protection, electric welding, taxation and jitneys that were presented at the second day's meeting. On the first day the main topic of discussion was insurance, this being taken up along the lines of fire insurance and prevention, life insurance and accident and casualty insurance. The papers that were presented at this session are now printed in abstract. There is included also an abstract of a special address on publicity by George Henry Payne, recently assistant to the vice-president and general manager, Wilkes-barre (Pa.) Railway.

Publicity and the Ills of Street Railways

Publicity, Now Practised by Most Large Companies, Is a Logical Development

BY GEORGE HENRY PAYNE

So many nostrums that are offered as cures turn out so frequently to be fatal that an analysis, or diagnosis, of any proffered panacea seems but reasonable. Just at the present time there seems to be a general belief that publicity is the cure for all the ills that have grown up, and the manifestations of that belief would have shocked the good old souls who fifty years ago saw the beginning of corporate and transportation development in this country. We can all imagine what the blunt old J. Pierpont Morgan would have said if he had read, as we now occasionally read, that "the press agent for the house of J. P. Morgan said yesterday, etc." I sometimes drop into the New York Central Building to see an able gentleman there who directs and guides all things in relation to public matters—the polite title for the press agent, and I wonder as I pass the corridor of the president of the road what the irascible old Commodore Vanderbilt would have said to these modern efforts in publicity, when to a complaint from the public fifty years ago his reply was "the public be damned!"

Only the other day we read in the papers that the heads of the five biggest industrial establishments in America had held a conference on business conditions, especially in relation to labor, and it was decided or recommended that hereafter every big business firm have a vice-president whose business alone would be to look after the welfare of the employees. One of the biggest banks is paying its publicity man $25,000 a year, a salary that a generation ago would have been ample for a bank president himself. The National City Bank, I am informed, has made it an unwritten rule that no one hereafter shall be elected a vice-president unless he is able to make a speech. The newly-appointed executive assistant to one of the big railroads here in the East was being introduced to the heads of the departments when a young man in charge of some minor department, thinking to make light and pleasant conversation, exclaimed. "Glad to meet you, Mr. Blank. Glad to meet anyone who can talk to reporters. I had one bothering me this morning—I gave him hell."

"The next time you give a reporter hell, you give me your resignation," said the president, and the dumfounded young man wandered away wondering what had come over the spirit of the "Old Man" who was known in his day as having among capitalists the long distance record for throwing a reporter.

John D. Rockefeller told a friend one time that not until he was put to it did he realize that after all a reporter could be a friend and from that time on he took a page out of the book of his friend Andrew Carnegie. Carnegie, long before the idea was popular, had a press agent and with true Scotch canniness saved the salary and was that press agent himself, and one of the best this country ever knew. The one-time popularity of the New York Central Railroad was undoubtedly due to the geniality and personal cleverness of its president, Chauncey M. Depew. It is now the fashion, more or less and, in fact, has been in recent years, to decry the ability of Depew, who at one time was prominent as a possible candidate for president. But men much less in ability and worth have been president, and few men have lived in this country who through sheer force of good-will and love for fellow kind have created about them an atmosphere that was a help to all that came in contact with them.

The inevitable question is: Why is this so? The answer is, it has been found to be "good business." It has been found that it pays. The answer I don't think is satisfying. The mere acceptance of a condition is not the best preparation for future conditions. In every healthy mind there is a genuine desire to understand the fundamental causes, the first cause, and aside from the real pleasure of having firm mental grasp and thorough understanding, there is the fact that after all it is only the historical method, this tracing of the evolution of things, this searching into the origin of things, that is going to guide as to the future. And surely in this day no one can say, when the future in so many directions looks so dark, that we should ignore or overlook any help that may seem at hand.

The emphasis on publicity to-day, the absolute necessity for it in many departments of the industrial world, is the logical development of the movement that began a little more than 100 years ago—the government of nations by public opinion. There were democracies in the world before ours, but they were democracies for a limited number, as with the Greeks, the Romans and the governments of the Italian cities in the Middle Ages. Under Jefferson, this became a government, the first of its kind in the world, where all citizens had a share in its privileges and where almost everyone was a potential citizen who was not already in jail—a remarkable experiment in the history of the world, unquestionably, and foredoomed to failure by European critics.

But along with the development of this government there grew up, also for the first time in the world, an extra-legal, an extra-constitutional check, as it were, both on the government and the citizens, the force of public opinion. And public opinion to-day rules the government, rules the nation but doesn't always succeed in ruling the source whence it comes.

It was public opinion, led by Greeley in the New York *Tribune*, and William Lloyd Garrison in the *Liberator*, and other great Americans who brought about the fight for the freedom of the slave and the election of Lincoln. It was also Greeley's desire to conduct the war that led to his cry "On to Richmond," with the result that Lincoln was obliged to send his untrained troops into the field, and the defeat of Bull Run followed.

After the Civil War there was a great development along material lines, and the native ability that had shown itself so conspicuously in the Greeleys, the Lincolns and the Sewards in the moral awakening before the war, now showed itself in the industrial giants who girdled the continent with railroads and drew out of the earth wealth up to that time more fabulous than that of Ormus or of Ind. The country was prosperous and happy when new leaders appeared, leaders of public opinion. From 1885 to 1905 there was a terrific agitation against every form of corporate wealth. The captains of industry who had once been our proudest possessions were the excoriated of the land; and I remember fifteen years ago a banker telling me at dinner that he had once been proud of his profession, but the thing that was worrying him now was how he was going to explain to his children when they grew up the terrible way in which he earned his living.

During the last ten years, or rather the last seven years, there has been a change, not a change on the part of those who were attacking corporations and capital, but a change on the part of the attacked. They have gone over, not in a body but in large numbers, to the other side, and have joined in the attack on capital. The son of one of the men who was most vehemently attacked throughout the country during the early years of the fight on capital is the financial backer of a Socialist organ whose most distinguished contributor once described his father as a malefactor of great wealth. A former member of the largest banking house in America is the financial backer of another magazine with similar, if not so strongly developed inclinations.

So, we have the philanthropists at the top and, what J. Pierpont Morgan called the anarchists, at the bottom. But between philanthropy and anarchy there is the great division of the middle class corporations and Americans who haven't enough money to join the one class and don't belong with the other. In their dilemma they are looking to publicity as a means of checking the ills that have grown up, along with the seemingly accepted idea on the part of a large part of the public that there is such a thing as definite evil and virtue in our industrial relations—the evil all on the side of capital and the virtue all on the side of labor. And in that seeking I think they are right, but the times I believe call for more than publicity of the "watch your step," "safety first," "don't cheat the poor subway" variety. They call for thought; they call for dispassionate scientific investigation. It is well and it is necessary that you have business leadership among business men, but you must have also intellectual leadership, leadership that will by force of its intellect and its thought command not only the respect of those to be led but the respect of those to be opposed.

A great financial institution of New York for years boasted that it did not advertise and would not advertise, until it saw other financial institutions of less reputation and stability encroaching on its domain. Then, it woke up, and two years ago, aside from the $50,000 or $60,000 spent in other channels of publicity, spent $20,000 alone in furnishing free advice to those who were perplexed by the provisions of the income tax law. Now that great institution boasts that it would rather have the good-will of the public than its deposits.

Publicity, yes, if it is publicity that commands respect and drives home thought. Not long ago, a traction company in a city not far from here in appealing to a more or less somnolent citizenry to awake and stop open—I might say official—outlawry and rioting, used in one of its advertisements a verse of Shakespeare dwelling on the value and power of truth and justice. A week later the rioters had a public parade, and one of the signs bore the taunt "Shakespeare never saw a trolley car." But there's where they made their mistake. Shakespeare did see a trolley car, for he seemingly saw everything that was in the heart and mind of man, and he saw and he knew that men and generations and centuries and eons would come and go, and whether men were evil or races failed, the principles of right and justice and truth would prevail. He had visions—the details of the inventions that were to come after are in accord with these visions.

And the visions that were fundamental in him were fundamental in the men who founded this government. They were of the very prophetic soul of the fathers.

Group Insurance for Electric Railway Employees

Most Profitable Investment in Handling of Employees—Has Great Value as Medium for Publicity

BY WILLIAM F. CHAMBERLAIN
Superintendent Group Insurance Division, Travelers Insurance Company, Hartford, Conn.

COMPENSATION insurance and group insurance manifestly differ in objects and results. Compensation insurance obviously provides compensation for employees only for accidental injury or accidental death occurring at occupation and during the hours of employment. Group insurance supplements compensation insurance, giving indemnities to employees for loss of time resulting from accidental injuries which occur away from employment or for any disease, and providing mortuary benefits to the dependents of a deceased employee without regard to cause, time or place of death. Group insurance can be written to afford protection for loss of time resulting from accidents at occupation as well as away from occupation. Where compensation insurance prevails it is unnecessary and undesirable to duplicate indemnities by group insurance.

Group insurance has proved by experience to be in many respects the most profitable investment in the modern method of the management of employees. It is a most satisfactory kind of welfare work because its results are observable. The aims and results of group insurance may be briefly stated as establishing good-will between employer and employee, cementing relations, discouraging misunderstanding and preventing industrial disturbances. It presents a most practical means for employers to show a personal constructive interest in their workers; it is an expression of interest which cannot be conveyed in so great a measure by other branches of welfare work.

Group insurance is a solution of the transient problem, especially when the contract is so written as to recognize individual worth and service by continued increase in the insurance. This adhesive influence is accentuated in the employee's home, where the dependents realize the value of the provision for their needs in event of the death of the wage earner.

Moreover, there is a publicity value resulting to the employer. This, of course, is a by-product, but it is of especial importance to utilities where favorable public sentiment is a desirable and valuable asset. A loyal satisfied employee renders the public a better and larger service. The public is interested in everything of economic significance which pertains to large numbers of persons.

There is also a monetary saving to the employee. A comparatively small percentage of industrial employees is insured for either life or accident insurance, for where insurance is purchased by the operative it is usually at a very high cost. Some employers believe that there rests on them the responsibility for arranging for these necessities either in whole or in part by group insurance. This cannot be counted as a substitute for wages, but with adequate wages it may properly be considered as an increase in remuneration.

Co-operation in Fire Insurance

If Electric Railway Fire Insurance Were Controlled by One Central Body the Cost Would Be Reduced

BY E. W. BOWMAN
Supervisor of Insurance Philadelphia (Pa.) Rapid Transit Company

THE subject of co-operation in fire insurance matters was brought to the attention of the American Electric Railway Association in September, 1913, and recommended for consideration at that time. It seems, however, that no action and probably but very little thought was given to it, as it does not appear to have been mentioned in any of the annual reports since that date.

The success of New England men in establishing factory mutuals seems never to have been duplicated elsewhere. Any number of mutual companies have been organized, mostly for the purpose of taking general risks, which for the lack of co-operation in fire prevention and general upkeep have proved practically failures. But no special class of manufacturers or public utility plants has attempted to follow in the footsteps of the New England pioneers.

Statistics from eighteen electric railways in Pennsylvania show the following results for the last five years: Total insurable value, $42,556,404; total premiums paid, $897,460; total fire losses, $90,208, and percentage of losses to premium, 10.05 per cent. If these eighteen Pennsylvania companies had agreed to co-operate at the beginning of this five-year period and had paid the same premium to an insurance board representing all the members the results would have been as follows: First year premium (average), $179,492; less expense (say 15 per cent), $26,924, and fire loss (10.05 per cent), $18,039—$44,963, or a net reserve the first year, $134,529. For the five-year period they would have a net reserve of $672,646, plus interest of $85,154, or a total of $757,800. These figures are based upon the payment of the full premium for the entire five years, after which time a sufficient reserve would have been established to warrant a return dividend at the end of each current year.

It might be said that there is no provision here for a catastrophe which might wipe out all funds on hand. If this fear is dominant, it would seem wise to take another course; *i. e.*, carry the first loss and re-insure all over that amount. Under these conditions large risks are carried at less than one-half the regular rates. The results on this basis, assuming a first loss of $200,000 and a rate of approximately 15 cents, would at the end of the five-year period be a net reserve of $353,473 plus interest of $44,748, or a total of $398,221.

For large quantities of any article better figures can be obtained. This prevails in the matter of insurance as well as in any other commodity. If all the electric railways in Pennsylvania were under one central control in so far as concerns upkeep, fire prevention and general supervision, there would be a prestige and a volume of business which would compel consideration by the rate making bureaus. The reputation for general care having once been established, the insurance companies would soon acquire that confidence which would without doubt result in a lower rating to all interested.

One more point should be mentioned. There is room for a closer co-operation between the mechanical department and the insurance department. All repairs to cars or buildings, all remodeling or building of cars should conform to the rules of the underwriters, even if by doing so the cost is slightly more. It is also well to establish a spirit of co-operation between company engineers and the insurance department whereby the true values of properties can be more nearly obtained. These values, once obtained, will through the application of a unit for depreciation and appreciation produce the real insurance value, which value should be the amount of insurance carried. By the same spirit of co-operation between the insurance department and the insurance adjusters, this unit can easily be arrived at before any loss occurs, thereby preventing any disagreements or delays at the time of loss by fire.

Safety Crusades

How the Work Is Carried On in Philadelphia—Safety Patrol Is Most Efficacious Means

BY BEATRICE V. CLINCH
Safety Bureau, Philadelphia Rapid Transit Company.

AT the Ad Men's convention, which was held in this city this year, I learned that it is the spectacular which attracts attention. Hence I have brought with me this afternoon the safety banner which I display in every school room that I visit. Safety first was not meant to tickle one's wits, but to set them to working.

Perhaps the first industrial campaigns were accused of being conducted principally because of the great financial economy to be attained. A safety campaign in the schools has been a gradual but natural development from the industrial phase of the work, and may be an economical procedure in one sense, but its great human side cannot be questioned. The youth of Philadelphia is being trained to caution and not fear and to recognize the dangers on the streets and the perils of modern life. There has been adopted by the Board of Education of Philadelphia this fall a course of civics for children below the eighth grade. Incorporated in this course is the subject "Safety First"—or fire and accident prevention. With this step accomplished it can truly be said we are nearing the goal of safety—everywhere—always.

During the past four years the management of the Philadelphia Rapid Transit Company has been active in urging the safety movement among the children. "Safety first" literature, blotters and stickers have been distributed in the schools. Money prizes were offered to the school children for the best stories on accident prevention. In the spring of this year the activities of the company in the interest of the children along this line were extended by having illustrated lectures given in the schools. During the summer months the story-telling hour in the playgrounds was utilized to acquaint the children by means of stories with the perils of the city streets.

Because of the stupendous waste of economic social assets in our city, especially during the summer, due to avoidable accidents, the P. R. T. extended a helping hand to the Play Street Grounds Committee, of which I am a member, which decided upon an aid to the solution of this problem pertaining to children. With the aid of the city departments and the Board of Recreation, play streets were opened. This was distinctly a "safety first" scheme, for it was decided if the children in our city, and especially in the congested districts, could be provided with enough safe places for play there would be fewer accidents on our streets. All people agree that children should play. Still they complain of the monopoly of the street and sidewalks by the children. Times have changed since father was a boy. In his day there were back yards, which meant trees to be climbed, tennis and ball playing, as well as abundance of space for hide and seek. Then there was an occasional stable or shed, which increased the possibilities of a good time tremendously. In the city's congested districts, such a thing as a back yard is almost unknown, there are not enough playgrounds, and the streets are more dangerous than ever before. Owing to the ever increasing traffic, the higher speeds with which vehicles move, the greater multiplicity of street cars and automobiles, and the higher speed of trains, the dangers which confront not only the child, but also the adult, are becoming greater and more numerous. More playgrounds are being opened every year, but until such time as there are enough playgrounds, the Play Street Ground Committee will rope off certain streets to vehicular traffic during the hours from 9 a. m. to 5 p. m. during the summer months. These streets are kept clean and turned over to the children for play. Two experimental streets were opened this year. The apparatus for these two play streets was provided by the Philadelphia Rapid Transit Company, and 21,000 children were entertained under the guidance of teachers. These experimental streets were a tremendous success, and the press of Philadelphia was very enthusiastic about the movement and gave hearty co-operation and splendid publicity.

The future of the safety movement lies with the education of the children. The child of to-day is the patron of to-morrow. The child mind is more impressionable and plastic than the mature mind, and lessons learned have a deeper imprint. At the same time the lessons must be imparted in a way that will appeal to the juvenile imagination. The following is some of the advice and information given to the children:

"To show you how necessary it is to look before attempting to cross in front of a car I will give you an idea of the speed of cars between squares in the city block. In order to enable people to get from one point to another it is necessary for cars to travel fast between squares, as they must slow down or stop at principal streets. Do you know that a street car ordinarily travels at about 12 m.p.h., covering 17 ft. of ground at every tick of the clock?

"It is dangerous to cross in the middle of the square or at small streets as the fast speed of cars at such points will not enable the motorman to look out for you or save you if you dash across directly ahead of his car. If you do this you alone are to blame if you are hurt.

"Persons passing behind standing or moving cars or vehicles should be very careful to look for objects moving in the opposite direction before attempting to cross the other track. The car or vehicle coming in the opposite direction cannot be seen until you cross to the other track, and this is dangerous, so it is best to wait until the standing car has started away so that you will be able to see the other car while you are standing in a safe place.

"I want to point out some of the difficulties which the motormen have to meet. I want to ask your friendly interest in these men. I am sure those who have never had an experience in operating a car can hardly know how hard it is to operate it on a greasy rail. Let me explain. You know how fast you can go over the ice on the narrow runners of a pair of skates, and how your weight carries you on without movement after you have made the start; it is just the same with the car, which weighs many tons and which has only a 2-in. rail to run on which may be greasy or slippy. When you think of the distance you can go without movement on your skates, you should understand why this much heavier car cannot be stopped in a few feet even if it is running slowly. With sand it is possible to stop quicker than without, but it takes time for the wheels to reach the sand after it has dropped on the rail, and the car moves forward during this time and may reach you before the sand takes hold.

"No matter whose the responsibility may be for an accident, what chance has a man, woman or child who has lost an arm or leg in the battle of life when compared with others who are not so afflicted and who are fighting for places worth while? To whom is the keeping of your body most vital, to you or to the motorman of the car, to you or the chauffeur of an automobile?"

THE SAFETY PATROL

Lectures, talks and stories are all good, but the most efficacious means, I believe, is to educate school children through the safety patrol.

The safety patrol consists of from eight to ten boys, selected by the principal of the school, whose duty it is to take up a position assigned them on the sidewalk a few minutes before the assembly in the morning and afternoon; also before dismissal of either session. These boys wear a badge. They are to see that no child leaves the sidewalk except at the main street crossing. This is one way of teaching the children that the main street crossing is the only safe place to cross the street. The patrol members also have duties while children are at play on the playgrounds. They are ever to be alert to aid in the elimination of dangerous practices and unfair play. The benefits of this plan will be the elimination of a great percentage of the avoidable accidents to children, and it will train a citizenry having the safety first movement at heart.

You can help if you will, and even though your part seems tiny to you, all working together it would mean much. The safety first movement is a twenty-four-hour job, and clock watchers need not apply. Also there is no room in the safety movement for the small man, but there is need of the broad-gage man who can see a principle and who is not afraid of his present job. The world was not finished in a day, and the safety first movement will not be concluded in a day. The movement needs many more big men to help, such as those already engaged in the work. Yes, we need more such men, because they are the fellows who believe that the life of the lowliest child is necessary in the onward march of progress.

Taking Precautions Against Accidents

The Author Points Out Various Points that Are Often Overlooked in Safety Work

BY A. G. JACK
Claim Agent, Southern Pennsylvania Traction Company, Chester, Pa.

WHILE there are many accidents over which electric railways have no control, there are others against which precautions may be taken, some of them apparently trivial. Careless or indifferent inspection is one cause of a number of minor claims which in a few years cost an appreciable amount. The innocent little tack and the projecting screw rend the passenger's clothing. A projecting bolthead catches the skirt of an alighting passenger and she is thrown off her feet. A shopman forgets to remove the impress of his greasy hand from the car seat, and it is shortly transferred to somebody's garment. An insecure grab-handle yields to the stress of a weighty person. Trap-door rings and floor screws, unless closely watched, stick up and catch the prevailing high-heeled shoes with danger of a spill. Stopped-up sand boxes and faulty gong-taps have contributed to more than one accident. The faulty controller has been a fruitful source of injury and consequent damages. These and similar oversights could readily be avoided by closer attention.

In this connection attention is called to the hazard of a metal roof on steel cars. Even though provided with a wooden foot board, the possibility of current contact through a misstep is always present to employees obliged to go on the roof for trolley trouble. A wooden roof is a much safer construction and should be provided.

The average trackman, while he may have a good eye to the general condition of his track, is often proverbially blind to many minor details of safety. Ruts along the rails should not be allowed to exist until a horse catches his foot or a wheel gets twisted. The projecting ends on an unused track should be so protected that a wheel could not get caught. Unsafe culverts should be repaired before something goes through. Temporary crossings over track construction should be made "fool proof," and all openings should be guarded. On bad grades all grass should be cleaned from track, leaves kept off and track sanded regularly in the autumn if the topography makes dangerous conditions. At all regular stops plank or cinder platforms to make a safe landing are a paying investment. A wooden marker, painted white, placed at either end of platform to indicate the position of the front of the car when at rest, aids the motorman so to stop his car that passengers alight safely. A desirable safeguard, especially for new men, is a white band painted on poles a certain distance from curves and switches.

A conductor does not have to learn any long set of rules to avoid accidents for which he is responsible, but only has to have present always the thought, "Watch your step and watch the bell." Similarly, passengers can be injured by the acts of the motorman in only one of the two ways, either by being thrown in the car by careless operation or by collision. Therefore, if the motorman heeds the admonition, "Watch the controller and look out for curves," he will eliminate injuries to passengers from the first cause. As to collisions, carelessness alone is responsible for most of the rear-end and right-angle ones. The only precaution possible is the knowledge acquired by experience and practice. In the case of the front-end collisions there enters the human element, over which there is no control. This would seem to be a situation where precautions are unavailable.

The question of precaution against vehicular accidents is one of the most serious problems. The placing of warning signs at railway crossings should be more general. Furthermore, municipalities regulate by ordinance the speed of vehicles on the streets and often prescribe a certain speed for trolley cars at intersections, while the state makes a certain speed legal on the highways. Why, then, should not certain requirements as to the speed of vehicles at all track crossings be made a state law? Such an enactment would be the most efficacious precaution that could be taken.

One contributing cause to many vehicular accidents is the pronounced indifference of motormen to use the gong or whistle. In many cases no alarm is sounded until just as the collision is about to occur, and then it is too late as a precautionary measure. Another contributing factor is the proneness of trainmen to discuss affairs at the front of the car, so that in an emergency the motorman is not on the job until too late.

A Safety-First Week Held in Richmond, Va.

Under the auspices of the Boy Scouts, a safety-first week was conducted in Richmond, Va., from Nov. 6 to 11, according to the plan mentioned by C. C. Johnson of the Virginia Railway & Power Company, at the National Safety Congress. This was referred to in an article in the ELECTRIC RAILWAY JOURNAL, Oct. 23, 1916.

The scouts patrolled every busy corner, distributing circulars and helping old people and small children across the streets. About 75,000 circulars were given out, among the most effective being a list of "Little Tragedies" comprising epigrammatic stories like the following: "He speeded up to see if he could beat the train to the crossing. He couldn't." "The man struck a match to see if the gasoline tank was empty. It wasn't." The school children were given circulars, and lectures with moving pictures were presented at the high schools, including a demonstration, by members of the fire department, of the correct method for sending in an alarm. The Virginia Railway & Power Company aided the work extensively by placing signs on the cars, distributing pamphlets and devoting the week's issue of their publication, *Public Service News*, to safety-first topics. The police department adopted a new system of traffic regulation at corners, lines being painted across the street to indicate the proper path for pedestrians and the proper stopping point for vehicles. The Richmond Automobile Club contributed to the work by pasting on the wind shields of all cars paper pennants bearing the safety-first motto. The newspapers indorsed the movement and helped to impress the public with its important purpose.

Standardization of Electric Motors

Among other activities of the Electric Power Club, through which the manufacturers of electric motors work toward standardization, a table of shaft diameters, keyways and certain tolerance limits for machining dimensions of large power motors was recently adopted as a standard for future design. A table of brush standards has also been adopted. The specifications for nameplate marking for large power motors were revised so as to include temperature and overload guarantees, and the allowable change in speed due to heating on fully inclosed direct-current motors was put at 15 per cent as compared with 10 per cent which is allowed for open or semi-inclosed machines.

Transporting the Third Wisconsin Infantry the Electric Way

Chicago, North Shore & Milwaukee Railroad Carries 762 Troops from Fort Sheridan, Ill., to Milwaukee, Wis., with Comfort and Without Delay

IN open competition with the steam railways interested, the Chicago, North Shore & Milwaukee Railroad obtained the contract by the quartermaster, Central Department, United States Army, for transporting troops of the Third Wisconsin Infantry from Fort Sheridan, Ill., to eleven points in Wisconsin in conjunction with the Chicago, Milwaukee & St. Paul Railway beyond Milwaukee. The electric line was the low bidder on these eleven points out of seventeen destination points in Wisconsin, on which bids were called for in the general circular of Dec. 6, advertising for sealed proposals in supplying transportation to this government. In all, the electric line handled 762 out of 1036 officers and troops, requiring twenty-one passenger cars and nine cars of baggage. The latter was moved principally on the night of Dec. 13, in advance of the troop movement on Dec. 14, when a train of seven box cars of baggage and a caboose with an escort were hauled to Milwaukee by an electric locomotive. Two cars of baggage followed the next morning.

The troops were handled with no delay or crowding in the all-steel and best equipment owned by the company. Only forty men were carried per car in order that there might be plenty of extra seats in the fifty-passenger cars for the luggage and equipment of the troops.

The troops were paid off in the quartermaster's department at Fort Sheridan and released a company at a time. They marched by companies out to the station and boarded the cars, and as fast as a three-car train was loaded, it was pulled away and dispatched to Milwaukee. This eliminated all delay, so far as the electric line was concerned, for the soldiers were carried on their way as rapidly as released. But three cars to the train were run, since this number could be taken to the unloading point in Milwaukee without breaking up into sections. The troops were unloaded from the cars on the sidewalk only one-half block from the St. Paul depot in Milwaukee and the cars were removed as rapidly as unloaded so that no delay resulted to following trains or regular traffic. That the movement was prompt and conveniently suited to the rate of mustering out of service is indicated by the following table giving the time the various three-car sections left Fort Sheridan and arrived at Milwaukee:

A COMPANY OF THE THIRD WISCONSIN INFANTRY MARCHING TO STATION TO BOARD ELECTRIC TRAINS FOR MILWAUKEE

Left Fort Sheridan	Arrived at Milwaukee
10:02	11:30
10:35	11:51
10:54	12:36
11:35	12:47
12:30	1:59
12:54	2:20
1:54	3:35

The handling of baggage was facilitated at Fort Sheridan by the use of two motor-truck moving vans supplied by the electric railway company to transport the baggage from the fort to the railroad. The basis of competition to the railway company for the transportation was $1.15 per capita less 8 per cent, and the distance from Fort Sheridan to Milwaukee was approximately 60 miles. This represented a substantial saving to the government over the lowest bid of the steam railroads.

Negotiations between the electric line and the War Department were conducted by F. W. Shappert, traffic and industrial agent.

Particular significance is attached to the securing of this business, as it is said to be the first time an electric line has been able to run the gantlet of opposition and break down the barrier which has apparently been placed between the regular army officers and the electric railways.

When interviewed by a representative of the ELEC-

SEVEN-CAR TRAIN OF BAGGAGE WHICH PRECEDED THE TROOPS ON HOMEWARD TRIP

TRIC RAILWAY JOURNAL, A. D. Kniskern, colonel, and K. J. Hampton, major of the Quartermaster Corps, Central Division, United States Army, responsible for the troop movement, said that the service had been entirely satisfactory, that the movement had been made smoothly and with no delays and that so far they had received no adverse comment in regard to the movement of the troops from any of the field officers.

Second Annual Convention of Safety First Federation of America

C. Loomis Allen Reported for Committee on City and Interurban Railways and James R. Pratt Presented the Street Railway Point of View

UNDER the auspices of the Safety First Society of Baltimore, Md., the second annual convention of the federation was held in that city Dec. 7-9, 1916. There was a business session on the morning of Thursday, Dec. 7, a discussion on street traffic on the afternoon of that day, a discussion on the railway trespass evil on Friday morning, and a discussion on fire prevention on Friday afternoon. The Saturday morning session was occupied with several topics including that of city and interurban railways, which was covered in a report by C. Loomis Allen, chairman of the committee on this subject. James R. Pratt, assistant general manager The United Railways & Electric Company, Baltimore, Md., also addressed the convention on "The Safety First Movement from the Street Railway Point of View."

REPORT OF COMMITTEE ON CITY AND INTERURBAN RAILWAYS

Mr. Allen reported that the greatest task before the committee at present is a comprehensive investigation of the following: (1) The laws and ordinances enacted by various municipalities to reduce accidents on and by electric railways, both city and interurban. (2) Means of co-operation between railway companies, civic authorities, and other bodies looking toward the education of the public in the matter of street accident prevention.

The committee recommended that for the ensuing year it take up definitely the following lines of work: (1) Obtaining ordinances and laws governing the movement of electric cars. (2) Careful study and analysis of these ordinances and laws, which should point clearly the desirable features which make for safety of passengers, employees and pedestrians, as well as pointing out the undesirable and dangerous features of these regulatory ordinances. In this study the experience of public officials, as well as operating officials of electric railways should be ascertained. (3) From this study it may be possible to arrive at certain fundamental principles which should govern the framing of codes.

The committee also recommended that as a means of bringing about a better understanding of methods of educating the public it communicate with chambers of commerce, and city and interurban street railway companies which have conducted safety first campaigns, and that, from the data thus obtained there be compiled a simple set of suggestions which might be of service to such organizations in the future.

In gathering data as above, attention should be given to the following: (1) The value of chamber of commerce leadership in this field as compared with leadership by the railway company itself. (2) Use of boy scouts in campaigns. (3) Use of motion picture theaters. (4) Use of local newspapers. (5) Use of schools. (6) Use of posters, blotters, stickers, etc. (7) Actual subjects to be taught, including use of crosswalks, use of safety zones, elimination of "jay-walking," elimination of trespassing on interurban railway property, teaching children the danger of hitching on the street cars and other vehicles, teaching children the danger of coasting across tracks, teaching children the danger of roller skating and of using coasters on downgrade streets across which cars operate, and right and wrong ways of boarding and leaving cars.

SAFETY FROM THE STREET RAILWAY POINT OF VIEW

Mr. Pratt first called attention to the accident risks which are inherent in the use of the street by electric railway cars, illustrating his point with numerical data. In Baltimore, for example, there are at least 1,500,000 boardings and alightings each day. Transportation companies long ago realized the weakness in the average person in failing properly to safeguard his movements while endeavoring to gain a few seconds of time. It therefore devolved upon the companies to surround their patrons with such safeguards as would in a measure offset this carelessness.

Among the many ways in which the electric railways are striving to reduce the number of accidents he mentioned the care with which platform men are selected, instructed and followed up; the safety committees which are endeavoring to stimulate watchfulness; the improvements in car equipment from the safety standpoint, etc. At the same time an endeavor has been made to impress the public with its part in accident reduction.

In illustrating the influence which automobile traffic has had upon street accidents, Mr. Pratt quoted from the Atlantic City paper by H. G. Winsor, in which a statement was made that whereas in 1910 there were 414,678 automobile registrations in twenty-six states, in these same states in 1915 there were 1,186,116 registrations, an increase of 355 per cent. He believed that the prevalence of street accidents from automobiles is due to rapid running over street crossings, and that no vehicle should have a superior right over other vehicles at street intersections, but that all should be required to operate with due regard for the rights of others.

Among other traffic regulations which Mr. Pratt considered would be conducive to safety, the following may be mentioned: In congested districts vehicles should not be allowed to stand on streets upon which street cars are operated except for a very limited time, say fifteen minutes. In such sections, when conditions permit, one-way operation on certain streets should have a good effect. In the licensing of automobile drivers the ability of a person to handle an automobile should be put to a higher test than that of his own judgment. All persons should be willing to supplement the efforts of the employees of the motor vehicle commissioner by reporting violations of the law which come to their notice. Pedestrians should not be permitted to cross public highways in the large cities in the middle of the block but should be limited to street crossings, and should be considered not to have discharged their duty when they have looked in both directions upon leaving the sidewalk, but should be expected to continue to look not only in front, but both to the right and to the left in crossing public highways.

In closing, Mr. Pratt stated that The United Railways & Electric Company has adopted as its slogan the following: "The United spirit stands for safe service—courteous service—efficient service."

RELATIONS WITH THE NATIONAL SAFETY COUNCIL

While at this convention no final plan of co-operation with the National Safety Council was adopted, the matter was very carefully considered. The federation has expressed its willingness to meet the Safety Council at least half way, and it is hoped that some plan of co-operation may be worked out in the near future.

Chicago's Traction Commission Report Transmitted to Council Committee

Completed Main Report Places Valuation of Elevated System at $70,400,916 and Total Purchase Price to City of Elevated and Surface Lines at $217,876,417—General Plan of Financing Given—Terminable Franchise Recommended with City Council Control and Rate of Return Fixed Between Limits of 6 Per Cent and 8 Per Cent—Traction Fund to Be Put Into Property with Interest Return at 6 Per Cent—New Legislation Recommended as Necessary to Plan

PRESENT SYSTEM

Area covered (within city limits)	**199 square miles**
Miles of track	**1109.36**
Passengers carried per day	**4,060,000**
Per cent of passengers carried in rush hours	**Over 50 per cent**
Average length of haul on surface lines	**4.16 miles**

THE main report of the Chicago Traction and Subway Commission authorized by the ordinance of Dec. 20, 1915, was completed and transmitted on the afternoon of Dec. 20, 1916, to Alderman Henry D. Capitain, chairman of the City Council committee on local transportation. The supplement to the report, which will present all the supporting detailed studies and analyses, is not yet finished, but the signed report as presented at this time gives the recommendations and plans of the commissioners as to final conclusions and serves to put the entire matter before the City Council. The final plans arrived at by the commissioners involve and are based on three fundamentals:

1. A physical plan of transit development covering elevated and surface lines and future subways.
2. The unification of these facilities along lines of maximum economy in construction and operation; and
3. A financial plan "based upon the present valuation of the surface lines and the valuation to be made of the elevated lines," which will present to the people of Chicago as accurate a prediction as possible of the probable results to be expected in the future if the commission's recommendations should be acceptable to both the city and the companies and put into effect immediately after the necessary legislative enactments have been secured to effect such a permanent and efficient consolidation.

The report takes up not only the traffic requirements upon which the proposed physical plan of surface line, subway and elevated development is based, but also the existing limitations—legal, financial and operative—with which both the city and the railway corporations are now handicapped in the execution of the desired plan. The commission has also considered the reasonable limitations of excessively rapid development of the transportation facilities in Chicago as compared with other cities, in order that the difficulties elsewhere encountered in transit development and finance may be avoided in Chicago and a reasonable, logical and efficient system be thereby assured for years to come.

The specific recommendations of the commissioners and their findings are intended to form the basis of an enabling ordinance to be passed by the City Council, under which the proposed unification may be carried out in accordance with amendatory legislation to be secured from the State Legislature. It is contemplated that this ordinance will cover in detail all of the provisions necessary to render secure future operation of the plan from both the viewpoint of the city and of the new corporation. This is, of course, in accordance with the City Council's instructions that the commissioners "shall consider fully the financial, economic and engineering aspects of the problem, having in mind the present and future transportation needs of the city."

The problem confronting the commission presented in some respects unusual difficulties due to the conflict on the one hand of the demands for improved transportation from every part of the city and, on the other, to the great area to be covered and the limitations of revenue from the thinly settled areas. At present, the 199 square miles of area included within the city limits contains 1109.36 miles of revenue single track (surface and elevated), and the normal daily traffic over the elevated and surface lines of the city is 4,060,000 passengers, of which 2,520,000 are cash and 1,540,000 are transfer. In addition, 157,000 steam and electric suburban passengers are carried to and from the suburbs of the city daily. Of the 4,060,000 elevated and surface line passengers, more than 50 per cent require transportation during the morning and evening rush hours, and 25 per cent of these travel to and from the loop district. With these conditions existing, the problem calls for a solution quite different from that which would be possible and practicable in a city more compact and densely settled and developed along a comparatively limited number of transportation routes.

The solution of the problem presented by the commission aims to abate the present loss from duplication which results from the competitive operation of the surface and elevated lines by encouraging a readjustment of traffic which will give to each system the passenger haul which it is best adapted to serve and thus convert the saving into additional service. At present it is found that the approximate average haul on the surface lines for a single fare—4.16 miles—is fully as long as the average passenger haul on the New York elevated lines which are primarily designed for long haul rapid transit.

In the determination of its findings the commission conducted very extensive traffic surveys in order to locate accurately the entire 2,500,000 residential population of the city, the origin of over 350,000 employees in the city's offices and factories, the actual routes of travel followed by over 500,000 elevated passengers, and the approximate routes of 1,500,000 surface line passengers. The destination of about 50,000 electric suburban passengers and 107,000 steam suburban passengers residing within an hour's ride from the center of the city were also located. Having in mind both the results of these surveys and the existing conditions by which the passengers are more or less arbitrarily directed—along existing routes of travel, as well as the financial and other considerations, the commissioners arrived at the physical plan which was set forth in the ELECTRIC RAILWAY JOURNAL of Dec. 9, 1916. The nine-year initial construction program there outlined involved a total expenditure of approximately $100,000,000.

The development of the financial plan hinges upon the unified operation of surface and elevated lines and subways under one management by a single corporation organized to take over the existing lines and construct future extensions thereto. It is also dependent upon new legislation which will permit the formation of the new corporation comprising all present transportation companies and make it possible for existing companies to surrender all present definite franchises and receive in lieu thereof a franchise to the new corporation terminable at any time by city purchase, by amortization or by forfeiture if the corporation fails to comply with the provisions of the ordinance. Legislation is also required to permit the city to grant such a terminable franchise and to empower the city to purchase the combined properties of the new corporation at any time in the future. Further legislation is needed to empower the city to procure the consent of abutting property owners where needed to carry out the extensions recommended in the report.

The commissioners' recommendations in connection with the financial plan include the provision whereby the partnership management now existing between the city and the surface lines under the 1907 ordinances shall be extended to include the elevated roads so that the city shall have a share in the divisible net receipts of the rapid transit lines on the basis of 55 per cent to the city and 45 per cent to the corporation. The city's traction fund is to be used for the construction of subways which are to be owned by the city in fee from the start. The city's share of future divisible net receipts should be applied in such a way as to facilitate acquisition of the properties by the city. It is planned that the present traction fund and all additions to it shall be invested on the same terms as new capital furnished by the corporation at the same time, except such parts as the city may find it expedient to invest under authorization of a board of control in urgently needed facilities which will not produce directly a definite revenue, such as street openings over or under rivers, railroad yards, parks, public utility galleries, etc.

The commissioners recommend that the corporation should receive 6 per cent on its present certified investment, consisting of a combined valuation of the existing surface and elevated properties as fixed and specified in a new ordinance to be drawn and based upon the commission's valuation of the elevated lines and the existing purchase price of the surface lines. This investment is to be ultimately reduced by amortization or otherwise under the financial plan adopted. On new money, the corporation should receive the actual interest paid by it on all obligations issued to raise such new money as may be authorized by a board of regulation and control, this provision applying to refunding as well as to existing and new securities.

Provision is made for the establishment of an amortization fund which will act to reduce progressively the outstanding valuation or purchase price to the city, comprising both old and new investments. This fund would be increased from time to time by such portion of the traction fund as was not required for new construction, and by any excess of the corporation return over 8 per cent, as described below.

The rate of return to the railway corporation is planned to be confined between the limits of 6 and 8 per cent on its then investment in road and equipments by an automatic provision in the financial scheme which provides for cumulative reductions in the corporation's interest and share so that its return shall never exceed 8 per cent. Any excess that may be earned over and above 8 per cent is to be paid back into the amortization fund. Such use of the traction and amortization funds is recommended as will establish a practical and feasible method of ultimate acquisition of the entire local traction system by the city, without necessarily burdening the taxpayers with additional mortgage indebtedness for transit construction.

The financial plan provides that on the new capital to be furnished only the interest actually paid is to be allowed. The commissioners recognize that the ordinary commercial risk of the business is, of course, one that falls on the railway corporation, and that there must be an opportunity for profit as an incentive to economical operation and for a margin to provide against catastrophe. It is accordingly recommended, in order to furnish protection against other risks, that the franchise should provide no burdens, such as orders for the construction of new lines, the imposition of additional taxes, or any other requirement on the part of the city, which would so reduce the corporation's share of the divisible net receipts that it would fall in any one year below 1 per cent of the gross receipts. If any deficit results, either to the city or to the corporation in the payment of their respective shares of the divisible net receipts, this deficit is to be carried forward and made up to the city or the corporation out of the subsequent divisible net receipts of following years, after the payment to the corporation of its minimum of 1 per cent of the gross receipts. In the event of such a deficit, the recommendations provide that it shall be the duty of the board of regulation and control to impose an increased charge for transfers between the surface and the rapid transit lines sufficient to make up this deficit. This charge may be reduced or abolished by the board of regulation and control when, in its judgment, the earnings have so developed that the full minimum payment of their respective shares can be paid to both the city and the corporation.

The full details of this financial plan and careful analysis of its operation are withheld for a later issue of ELECTRIC RAILWAY JOURNAL, when the final checking shall have been completed. The plan comprises some new and extremely interesting features which will be later carefully treated.

The necessity for new enabling legislation arises from the fact that the elevated roads and the surface lines are organized under state and city authority respectively, and consequently cannot be merged without new legislative grant. Also, the existing legal conditions whereby a single property owner has the power indefinitely to obstruct needed public improvements by refusing frontage consents, even though the work may be an essential element or link in an improvement affecting a large part of the city, makes legislation in this respect necessary.

Further, in order to enable the railway corporation to raise the large sums of money needed for the recommended improvements and to sustain its credit to permit the financing of future extensions, it is recognized that the franchise situation must be placed upon a more assured basis than at present. With the surface lines' franchises expiring in ten years and the elevated franchises expiring in various periods from thirteen to twenty-eight years, and in view of the uncertainty of the city being able to purchase the surface line properties in 1927 without further legislation, the commissioners recommended as the most practicable course open the surrendering of all present franchises and the issuance of a new franchise in which the equalization of franchise terms would be automatically brought about. The terminable type of franchise was determined upon by the commissioners as the only one which would avoid the financial embarrassment usually encountered at the end of a short-term franchise, or at some future time near the end of a long-term franchise, and at the same time secure to the city the legal right whenever it elects to take over the properties at any time upon a basis fair and equitable to both parties, should the city desire to acquire the properties or should the companies fail to fulfill the terms of the franchise grant.

The commissioners have recognized that the value of the purchase clause is in effect nullified to a large degree when the city finds itself unable to pay the agreed purchase price by reason of the debt limit imposed upon it by law. This is the situation which confronts Chicago at the present time, and unless the future debt limit is raised by legislation, it would also be the case in all probability ten years hence when the city would be confronted with the alternative of purchase or extension of the 1907 ordinance term.

AMORTIZATION AND REGULATION

These difficulties are believed by the commissioners to be met in the terminable form of franchise grant recommended, when combined with the amortization features above enumerated, which for the first time will then become a new element of the utmost importance in securing the financial and operating stability of the Chicago traction properties. This amortization is brought about in two ways: first, by the regular amortization fund to which annual payments are made prior to the division of net receipts, and second, by the investment back into the traction property of the city's entire traction fund with its annual additions and interest for which no new actual obligations would be issued for it. That is, all traction fund investment by the city representing prior contributions from the revenue fare will continuously operate to reduce the purchase price to the city below the total investment in the traction system, without adding additional mortgage liabilities or burdens upon the taxpayers for construction which would otherwise have to be financed by the companies themselves. The amortization fund alone will retire a very considerable proportion of the outstanding investment within the next twenty years. Thus it appears that Chicago's foresight in establishing and conserving a traction fund, which by the time the actual subway construction begins will approximate $21,500,000, will result in the possibility of automatically transferring to the city within a reasonable term of years the entire equity of the entire Chicago traction properties, including subways and further extensions, so that acquisition by the city will eventuate in fact as well as in theory.

The commission finds that "a reasonable forecast of the results obtainable under this financial plan indicate that by about 1937, or at the end of twenty years, there will have been amortized actually or in effect nearly $120,000,000 of investment, or about 30 per cent of the then total investment in combined properties. The continuation of this forecast indicates that about 1947, or in thirty years, not only will all of the additional capital furnished by the corporation as contemplated in this report be paid off, but the operation of the amortization fund and the city's traction fund will probably begin to reduce the original 1916 valuation of the combined properties; and * * * * possibly by the year 1960 the whole of the corporation's then investment will have been retired. The city of Chicago would then become the actual owner in fee of a combined system of subway, surface and elevated railroads which, in accordance with the orders of a board of regulation and control, and the provisions of the ordinances, will have been maintained at full efficiency and will have cost about $490,000,000, which the city can then operate or lease to an operating corporation as public opinion at that time will determine."

After considering various methods of insuring the city its full rights in all administrative matters, the commission concluded that a non-political board of regulation and control, organized largely along the lines of the existing board of supervising engineers (under the 1907 ordinances), but with added duties and powers, would best fulfill the needs of the situation in carrying out the provisions of the proposed ordinance. This board would also be empowered to administer the manifold details of finance, organization, construction, service and extensions, "reserving to the City Council such general authority as it should retain." This board, thus clothed with the necessary powers of enforcement would order into execution and supervise the various steps in the construction plan outlined in the report or such amendments thereto as the development of the city might require. It would ascertain and certify to the cost of the corporation's investment, pass upon the obligations issued therefore, certify to the city's investment, supervise plans and specifications, exercise general powers of supervision and audit over the corporation's account, regulate the transfer charge, order on its own initiative such expenditures for road and equipment as necessary or appropriate for furnishing proper service, and report to the City Council on request as to the reasonableness of service ordinances which might be pending therein. The commissioners contemplate that the enabling ordinance specifying the powers of this board will confine its provisions to the fundamental questions covering construction, operation and administrative matters of a contractual character, leaving to the board the decision on all points, the character of which necessarily will vary from time to time.

In making the historical study of the values of the elevated system, the commissioners were largely confined to the book accounts of additions, extensions, betterments and rehabilitations since the beginning of actual operation. In the absence of the original cost of acquiring the rights-of-way, it was impossible to trace the financial development of the properties from the beginning of operations to the present time. The only direct course open, therefore, was to determine and start with the cost to reproduce new the properties as they exist to-day and then deduct the accrued depreciation to arrive at the present value. By this process, and omitting many details which will be presented later upon the completion of the supplement to the report, the commission arrived at the valuation for the elevated properties as they exist to-day, and placed the figure at $70,400,916. This is recommended as the "agreed purchase price" to the city to be combined with the purchase price of the surface line properties which is $147,745,501, as of June 30, 1916, in both cases, to make the total purchase price for all local traction properties to be written into the proposed ordinance $217,876,417.

"So far as the surface lines are concerned the method of determining the purchase price was fixed by the existing ordinances, and the ordinance appointing the commissioners direct that it accept this valuation." In the financial negotiations between the companies "the commissioners do not attempt to fix the amount of $70,400,916 as the proper basis of adjustment of values between the companies themselves, but only as a part of the total purchase price to the city of $217,876,417, the commissioners' function being to see that the total purchase price is fair to the city and not unjust to the companies."

Light and Power Accounting*

Interesting Subject, and Electric Railway Accountants Will Be Better Executives for Studying It

BY A. E. DEDRICK
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WHEN it is considered that this paper on electric light and power accounting is presented before a body of accountants identified with the electric railway industry, it assumes an especially important aspect. It is another indication of a growing tendency on the part of various associations to broaden out and absorb some of the things closely akin to their own profession or work that may have been neglected, largely because no particular immediate need has been felt for information along such lines. During the last five years many such changes have been brought about. In the parent association we have as examples various committees, engineering-accounting, transportation-accounting, etc., that were born of the necessity of knowing something more than mere "railway accounting." We must also have, however, a knowledge of "electric lighting accounting," and other companies doing a freight and express business must have accountants of still broader experience in "freight and express accounting." We might even point out that, as a requirement of the future, the far-sighted accountants wishing to progress to the "seats of the mighty" will absorb a fair knowledge of "engineering."

The principal difference between railway and electric lighting accounting was described by one of our collectors of bygone days. He said: "In the railway business you collect your money before you render any service, but in the lighting business you extend the customer liberal credit and then play tag with him until you get him in a corner, and he pays you, usually under protest." This is, no doubt, the viewpoint from the collection department, but it is not the true difference as far as the general subject of accounting is concerned. The same fundamentals apply in both cases, but the details vary.

The old way of computing lighting bills by hand has given way to a more efficient method of comptometer calculating. The ledgers are posted, both debits and credits, by a bookkeeping machine which automatically carries over the unpaid balance. The bills are turned out neatly, quickly and uniformly by the Addressograph and Burroughs billing machines, which print both the body of the bill and the duplicate stub with one operation. The more mechanical the operation, the greater is the efficiency of the operators, a factor that is of prime importance at this time on account of the scarcity of clerical help. Moreover, the more mechanical the work, the lower is the standard of experience required, with a corresponding saving in the cost of operation.

This last may seem like a broad statement, but it can be proved by referring back to the days when all the office work was, with the exception of letter writing, done "by hand," so to speak. The general books were kept by a man, usually one of the oldest in the department, and the young clerk who had the opportunity of posting journal entries, to say nothing of preparing them, after two or three years of service, thought he had reached the pinnacle of fame. At the present time, by the careful selection of employees and the proper routing of work, the thinking element is transferred to suitable clerks hired and trained for the purpose of thinking, while the routine work is turned out by clerks whose efficiency is high because they are not required to puzzle their brains over problems that break into the routine of their work.

The details of light and power accounting are rather more complicated than those of railway accounting. A complete and revised-to-date history must be kept of each consumer, of the dates when the meters were set and removed from his premises, of the make, type, number, etc., of the meters. Similar information must be kept for transformers, some companies handling all data on meters and transformers through the same department.

A customer's file, in which is kept all correspondence and records pertaining to the account, complaints, adjustments, etc., is quite necessary. The data so compiled must be available for instant use, as customers have a habit of calling on the 'phone and asking questions that must be answered or explained at once. If you call up your butcher or grocer about an error or discrepancy in your account, he may safely say that he will have the bill checked and report to you later on, but this procedure will not do for the average lighting customer.

Better results are obtained if the subject in question can be explained at the time the inquiry is made, and the customer made to feel that he is receiving attention and consideration. The company with which the writer is connected makes a typewritten report of each complaint, and when this is adjusted, the full data are attached so that a complete record of the customer may be kept. This permits of comparison of the departments by months and is a valuable guide to ascertain how the different departments are progressing, for it must be borne in mind that no matter how efficient the different units are working within the company's organization, the work is for naught if the customer is dissatisfied.

Meters must be routed and accounts arranged in sequence, so the same account will be read as nearly as possible on the same day each month, and collections must be systematically followed in the same way. Many companies sell washing machines, portable lamps, flatirons, toasters, vacuum cleaners, etc., on the installment plan, and care must be taken to insure collections on schedule time.

Costs may be kept by groups that will be found of great value in determining whether or not it is advisable to make extensions to serve other groups. Moreover, to comply with many franchise conditions requires accurate and detailed costs, for without full and sufficient data it is a guess as to whether or not the requirements can be met and leave a profit to the company. Many railway companies, too, are supplying light and power to small groups of customers along their lines, and this class of business is expanding very rapidly. The gross income from this class of business in many instances seems hardly sufficient to warrant keeping separate costs, yet if such costs are kept, in accordance with the uniform system of accounts promulgated and issued by the National Electric Light Association, the results will amply repay for the time spent.

The lighting and power business generally requires more statistics and is subject to greater exactions along certain lines than railway accounting, but the basic principles being the same, it is not a serious problem for the accounting officers of interurban roads especially to become familiar with light and power accounting methods and problems. Many of them have use for such knowledge in connection with the extension of lighting service into the small towns in their territory. Aside from being quite necessary in many instances, however, it is an interesting subject to study and electric railway accounting officers are better executives for knowing accounting methods so closely connected with their industry. The lighting and power field offers much for the student in efficiency and office management.

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*Abstract of paper presented at meeting of Central Electric Railway Accountants' Association in Cincinnati, Ohio, on Dec. 9.

COMMUNICATION

Converting Indifferent Passengers into Loyal Customers

PHILADELPHIA, PA., Dec. 20, 1916.

To the Editors:

I am glad to notice the attention which you are giving by cartoons and otherwise to the subject of public relations. In this day when manufacturers and merchants steadily strengthening their businesses by improving service to customers, why is it that some electric railway companies still handicap themselves by methods which efficient commercial men have discarded?

To the executives of such railways obviously it is not apparent that they are marketing transportation with an attitude toward their passengers unpleasantly similar to that which prevailed years ago among merchants, namely, "We have the goods, you can't get them anywhere else in town, and the price is so much." Such merchants trained their salesmen to meet customers by acquainting them rather thoroughly with the stock, drilling them on price-ticket symbols and saturating them with fear of a hundred penalties devised to prevent mistakes in sale checks, shortages on inventory and what not. So the railways to which I refer train their conductors by teaching them something about a trolley car's construction, drilling them in handling money correctly and rapidly and impressing upon them a bookful of rules (with penalties) about ringing up fares, seeing that everyone is safely aboard before starting the car and getting the names of at least three witnesses every time the slightest accident occurs. So also do they show the motorman how to operate the car with maximum safety and how to make his time with minimum wear on the expensive machinery.

When a customer of the old-time store expressed dissatisfaction, the merchant's first move was often to see how that complaint could be most skillfully smothered. Railways are still smothering complaints, often politely, it is true, and the "investigator" who can secure signatures of "eye-witnesses" or injured persons to what seems an airtight accident statement is still a valued employee, notwithstanding the ventilation frequently given such statements when a damage suit jury retires to discuss the case.

Well, what has an electric railway—intrenched behind a long-term, exclusive franchise—to gain by spending some money to supply genuine service with its transportation; to wear an every-day attitude toward its passengers like that worn to-day by a great retailing corporation whose president, one afternoon, telegraphed each of thousands of salesmen this amazing question: "Have you said 'thank you' to every customer to-day?"

Mr. Average Citizen can answer the question. Suppose I, the average citizen, depend upon electric cars to ride the 3-mile distance between my downtown office and my home in some attractive residential section. My family must use the cars, and we all ride down to the theaters. We use the interurban when we spend a Sunday with friends in the next town. If the railway company seems to be running cars with reasonable frequency, regularity and speed; if the cars are comfortably warmed in winter and sufficiently lighted on dark afternoons to give me a chance at the evening paper, I probably will stand uncomplainingly when all seats are taken, but I shall feel no interest in the railway company.

Now, suppose my evening newspaper commences publishing a monthly statement about traffic on the system as a whole—a moderate-sized advertisement over the signature of the railway company's president. The statement is so simple, clearly set and prominent that I cannot help reading it. By figures and interestingly written information I am frankly told about the volume of business done during the month just ended, and why the service given was the company's best.

Likely as not I see that statement shortly before I reach my corner. Its favorable impression lingers as I press the signal button opposite me and start pushing through the crowd toward the rear door. If the conductor holds his car ten seconds for me to get off, instead of starting the moment those who were actually at the door are on the ground, thus carrying me a block past my corner, I cannot help linking that obliging act to the company's advertisement. If he smiles instead of saying sharply, "Lively, please," that, too, makes an impression.

Suppose, also, when I reach home my wife relates how she and other passengers traveling to the next town that day on the interurban were compelled to walk several hundred feet where repair work was in progress, and that the only reason she reached her destination in presentable condition was that a rough plank walk had been built above the mud by the company. Her story recalls to my mind an advertisement in the morning paper announcing that in the interests of safety and time saving the company would commence that day to straighten and renew a certain stretch of track on the line in question, but that meeting schedules and transfer facilities had been so arranged as to give passengers no more than slight delay and inconvenience.

Suppose I continue noticing that this company's employees almost invariably serve as if they felt pride in their efficiency and courtesy; that every little while its president had something to say about its administration; that I learned from a merchant friend how fairly and frankly the company dealt with him in adjusting his claim for a smashed delivery wagon, while not neglecting its own rights in the matter.

Now isn't it reasonable to presume that the average citizen would respond to a railway policy expressed through many such examples as those just mentioned? Often enough he has selected for his patronage one out of several good stores because he likes its policy, and he speaks of it with pride as a credit to his town. Should he not feel the same way about his electric railway system?

Isn't it logical to suppose that, having gained his good-will, the railway company can borrow his money upon proper security and can hold his patronage by its safety and assurance of carrying him comfortably, in all weathers, to his destination when irregular transportation competitors arise? Isn't it likely that his influence will bear strongly enough upon his alderman or State legislature representatives to disarm political or other demagogues having unworthy designs?

Conditions which the electric railway industry will be called upon to meet in future are uppermost in the minds of operators and investors to-day. What is there about the industry to prevent strengthening it by more skillfully cultivating loyalty among its employees and respect among its customers; to do these things systematically instead of just hiring men and giving the public the most economical service that can "get by"; with very little effort made to create public interest and support for so splendid an asset as a good electric railway is in any community?

Free from competition, as a rule, the electric railway can concentrate upon supplying the best service its income affords and upon winning prestige. If its employees are systematically impressed with their proper importance as the company's representatives in handling customers, have fair wages and working conditions, and some extra competitive incentive for sustained efficiency, and are thoroughly supported when attacked by unjust complaints, they should improve steadily in pride, competence and courtesy to passengers. There is in almost every honest American workman a potential response to appreciation and support from his employer.

If it be true, as many think, that there is no limit to which regulation of public utilities can be carried if the people so wish, then, conversely, there should be no limit to the good-will which utilities can create by practising frankness with the people and cultivating their interest. ROBERT HOLMES ELMENDORF.

MID-YEAR MEETING
BOSTON
FEBRUARY 16, 1917

ASSOCIATION NEWS

MID-YEAR MEETING
BOSTON
FEBRUARY 16, 1917

Secretary Burritt Announces American Association Committee Appointments—Recent Meetings Indicate General Activity on the Part of the Various Committees—Biographical Sketches of New Company Section Officers—General Company Section News

American Association Committee Appointments

Secretary Burritt has announced the following appointments to American Association committees. Other committee lists will be announced as completed.

Previous committee appointments as completed were announced in the following issues of the ELECTRIC RAILWAY JOURNAL: Transportation & Traffic Association, Nov. 25, page 1115, and Dec. 9, page 1207; Accountants' Association, Dec. 2, page 1162, and Dec. 9, page 1207; Engineering Association, Dec. 9, page 1207, and Dec. 16, page 1252.

Company Sections and Individual Membership.—Martin Schreiber, Newark, N. J., chairman; W. J. Flickinger, New Haven, Conn.; C. S. Kimball, Washington, D. C.; E. J. Blair, Chicago, Ill.; H. H. Norris, New York City.

Compensation for Carrying United States Mail.—Henry S. Lyons, Boston, Mass., chairman; George H. Harries, Omaha, Neb.; P. N. Jones, Pittsburgh, Pa.; F. R. Coates, Toledo, Ohio; M. S. Sloan, New Orleans, La.; F. T. Griffith, Portland, Ore.

Constitution and By-Laws.—George H. Harries, Omaha, Neb., chairman; R. I. Todd, Indianapolis, Ind.; Harlow C. Clark, New York City.

Education.—H. H. Norris, New York City, chairman; H. A. Bullock, Brooklyn, N. Y.; Martin Schreiber, Newark, N. J.; W. L. Robb, Troy, N. Y.; D. D. Ewing, Lafayette, Ind.; A. M. Buck, Urbana, Ill.

Electrolysis.—Calvert Townley, New York City, chairman; R. P. Stevens, Youngstown, Ohio; L. D. H. Gilmour, Newark; J. E. Woodbridge, San Francisco.

Federal Relations.—Arthur W. Brady, Anderson, Ind., chairman; F. W. Brooks, Detroit, Mich.; L. S. Cass, Waterloo, Iowa; H. E. Chubbuck, Peoria, Ill.; E. G. Connette, Buffalo, N. Y.; R. I. Todd, Indianapolis, Ind.; Frank R. Ford, New York City; E. C. Foster, Manchester, N. H.; F. T. Griffith, Portland, Ore.; George H. Harries, Omaha, Neb.; Marshall S. Morgan, Philadelphia, Pa.

Mid-Year Meeting and Dinner.—M. C. Brush, Boston, Mass., chairman; C. R. Ellicott, New York City; C. Loomis Allen, Syracuse, N. Y.; Charles C. Peirce, Boston, Mass.; T. S. Williams, Brooklyn, N. Y.; E. L. Janes, New York City; John J. Stanley, Cleveland, Ohio; B. A. Hegeman, Jr., New York City; Myles B. Lambert, Pittsburgh, Pa.; C. P. Dennett, Boston, Mass.; H. E. Reynolds, Boston, Mass.; C. V. Wood, Springfield, Mass.; Harlow C. Clark, New York City; E. B. Burritt, New York City.

Operation of Motor Vehicles.—Britton I. Budd, Chicago, Ill., chairman; William A. House, Baltimore, Md.; Henry G. Bradlee, Boston, Mass.; C. L. S. Tingley, Philadelphia, Pa.; Frank Silliman, Jr., Philadelphia, Pa.; A. M. Patten, Topeka, Kan.

Subjects.—J. D. Mortimer, New York City, chairman; R. I. Todd, Indianapolis, Ind.; Calvert Townley, New York City; J. H. Pardee, New York City; M. R. Boylan, Newark, N. J.; R. E. McDougall, Rochester, N. Y.; F. R. Phillips, Pittsburgh, Pa.; L. C. Bradley, Houston, Tex.

Committees Active All Along the Line

During the past few days many association committee meetings have been held. On Dec. 14 and 15 the Engineering Association committee on standards met in New York City; on Dec. 15 the joint committee on block signals met in Newark, N. J.; on Dec. 15 and 16 a largely attended meeting of the committee on schedules and time tables was held in Boston; the American Association executive committee met in New York on Dec. 20. Other meetings were scheduled but reports of all of the meetings held are not yet available. A brief report of the latest meeting follows.

Reports of the other meetings mentioned will appear in a later issue.

AMERICAN ASSOCIATION EXECUTIVE COMMITTEE

At the meeting of the executive committee held in New York on Dec. 20, the status of manufacturer members in the association was fully discussed and the representatives of the manufacturers in the executive committee were appointed a sub-committee to consider the carrying out of the recommendation contained in President C. L. Henry's Atlantic City address and to report at the midwinter meeting. These referred to provision for the more active participation of the manufacturers in the management of the association.

Those in attendance at the meeting were as follows: Officers, L. S. Storrs, New Haven, Conn.; T. S. Williams, Brooklyn, N. Y.; J. J. Stanley, Cleveland, Ohio; E. B. Burritt, New York City. Representing affiliated associations, M. R. Boylan, Newark, N. J.; R. E. McDougall, Rochester, N. Y. Past-presidents, A. E. Lang, Windsor, Vt.; C. S. Sergeant, Boston, Mass.; W. Caryl Ely, Buffalo, N. Y.; James F. Shaw, New York City; George H. Harris, Omaha, Neb.; C. Loomis Allen, Syracuse, N. Y. Representing manufacturers: E. W. Rice, Jr., Schenectady, N. Y.; Samuel Curwen, Philadelphia, Pa.; James M. McGraw, New York City. Ex-Secretary H. C. Donecker was also present.

Photo by Harris & Ewing
FLAVIUS MORRILL
President
Capital Traction Co. Section

Photo by Clinedinst Studio
J. E. HEBERLE
Secretary
Capital Traction Co. Section

ARTHUR T. WARNER
President
Public Service Railway Section

FRANK J. DAVIS
Secretary
Public Service Railway Section

Some Facts Regarding New Section Officers

Following its usual procedure, the ELECTRIC RAILWAY JOURNAL will give this year some biographical notes regarding the presidents and secretaries of the several sections. Several such sketches are given below.

CAPITAL TRACTION COMPANY SECTION

Flavius Morrill is president of company section No. 8 this year. He is roadmaster for all the lines of the Capital Traction Company and was vice-president of the company section until elected president this fall. Mr. Morrill has been in the street railway business for about twenty-eight years, the preceding thirty-one years having been spent on a Michigan farm and in a Missouri grocery store. In 1889 he went to Kansas City to work for Edmund Saxton, a cable road contractor, in the construction of the Holmes Street Cable Road. He accompanied Mr. Saxton to Washington in the same year to assist in the construction of the Seventh Street cable road of the Washington & Georgetown Railroad. Upon the completion of that work he was employed by Henry Hurt, then president of the road, to take charge of the track work of this line. In 1892 when the cable was installed on the Pennsylvania Avenue and Fourteenth Street lines of this road, he was transferred to the Peace Monument and took charge of the auxiliary machinery which operated the short cable from this point to the B. & O. Railroad depot. In 1893 he was made roadmaster for all the lines of the company and was continued in the same position by its successor, the Capital Traction Company.

J. Edward Heberle, the secretary of this section, is a native of Olean, N. Y., and he is exactly one-half the age of the president of the section. He was educated in the Olean parochial and public schools and in Westbrook's Commercial College. He entered the employment of the Capital Traction Company in 1907 and was appointed chief clerk at the beginning of 1916.

PUBLIC SERVICE RAILWAY SECTION

Arthur T. Warner, who after effective service as secretary of Section No. 2 was recently promoted to the presidency, was graduated in the electrical engineering course at Lafayette College in 1910. He immediately entered the employ of the Public Service Railway as cadet engineer and completed the full two-year course. Immediately thereafter he was made a traffic investigator, and on Jan. 1, 1916, became traffic engineer. He is attached to the time-table department, in all the problems of which he takes a lively interest. In addition to having been secretary of the company section for two years, was for three years secretary of the Public Service Railway Athletic Association.

Frank J. Davis, report clerk of the company, is Mr. Warner's successor as secretary of the section. Immediately after completing his grammar school course in 1903 he entered the employ of the North Jersey Street Railway, one cf the predecessor companies of the Public Service Railway, as mileage clerk. He afterwards completed a secretarial course in a local business college, was appointed as stenographer in the accounting department in 1904, and in less than two years thereafter was made head stenographer in charge of the stenographic and typewriting department.

CHICAGO ELEVATED SECTION

E. J. Blair, who is president of Company Section No. 6 this year, is electrical engineer of the Chicago Elevated Railroads. He has been with the Elevated Com-

E. J. BLAIR
President
Chicago Elevated Ry. Section

M. W. BRIDGES
Secretary-Treasurer
Chicago Elevated Ry. Section

JOHN T. MOFFETT
President
Washington R. & E. Co. Section

R. A. VETTER
Secretary
Washington R. & E. Co. Section

panies since his graduation from Cornell University in 1905. At first he was put to work in the car shops of the Metropolitan West Side Elevated Railway and, after spending a few years in the equipment, maintenance-of-way and power departments, he became electrical engineer of this company in 1909. At the time of the consolidation of the elevated railroads in 1911, Mr. Blair became electrical engineer of the several companies. He has been active in the work of the local section since its inauguration and has also devoted much time and energy to the larger work of the Engineering Association. His appointment to membership on the electrolysis and power distribution committees was mentioned in recent issues of this paper.

M. W. Bridges, secretary-treasurer of this section, is chief clerk to the master mechanic of the Elevated Railroads. He has been with the companies for about six years, having started work as timekeeper in the transportation department of the South Side Elevated Railroad. He was later transferred to the shop department as shop clerk and, at the time of the consolidation of the elevated lines, he was assigned to the master mechanic's office and was later made chief clerk. Before going into electric railway work, Mr. Bridges was in the general offices of the Chicago & Alton Railroad.

WASHINGTON R. & E. CO. SECTION

Jacob T. Moffett, this year's president of section No. 4, has grown up in the transportation division of the industry, having continued to serve his present employer more than twenty-five years. He rose to the position of superintendent of transportation by the following route: He began as a conductor, but after less than one year of service was promoted to the position of night clerk, and after three years more to that of day clerk in which position he remained until 1899. In this year he became division superintendent and during the following four years served in several divisions, at the end of this time being made superintendent of transportation. He is an enthusiastic company section man and his associates say that he has greatly helped in developing a progressive spirit in the local section.

R. A. Vetter, who is serving his second year as secretary of this section, is law clerk for the legal department, which office is also general counsel for the Washington-Virginia Railway. Mr. Vetter has been in the employ of the company for six years, serving first as clerk in the office of the general manager, and later being transferred to the accounting and treasury departments. When the legal and claim departments were reorganized in 1914, he was assigned to the office of the general attorney. While in the employ of the company he followed an evening law course in Georgetown University, secured the degree of Bachelor of Laws in 1915, and was subsequently admitted to the District of Columbia bar.

Connecticut Company Section

Secretary W. E. Jones reports a very profitable meeting of Section No. 7, held on Dec. 14. The papers read were as follows: "Prolonging the Life of Old Rail in Connection with Permanent Pavement," by M. E. Stark, roadmaster Bridgeport Division; "Reminiscences of the Old Horse-Car Days," by John A. Crilly, claims adjuster, Hartford, and "Car Ventilation," by George H. Ford, Automatic Car Ventilator Company, New York. The meeting was preceded by a dinner at the Hotel Garde, New Haven. The company section orchestra played several times and there were also some vocal solos.

In his talk Mr. Ford explained why provision for ventilation is necessary, and he cited many interesting statistics on car ventilation. He also explained how ventilation systems are in most cases expected to perform under the most extraordinary conditions. In view of the fact that at this time of year the public becomes critical of car ventilation, due to the necessary use of closed cars, Mr. Ford's talk was considered particularly appropriate and it provoked considerable discussion.

Near-Side Stop Discussed in Denver

With an attendance of 150 the December meeting of the Denver Tramway Company Section, held on the 17th, was one of the most successful meetings of this section. James L. Adams, recently appointed superintendent of transportation to fill the vacancy caused by the resignation of William M. Casey, first addressed the meeting briefly. H. S. Robertson, attorney, then read a paper on near-side stop operation, supplementing it with an explanation of a related important city ordinance which becomes effective on Jan. 1, 1917.

"Stunt" Program of Capital Traction Section

Company Section No. 8 held its meeting on the regular date, Dec. 14, but with a decidedly unusual program. About 130 members and guests were present.

The first feature was a talk by W. H. McCarty, master mechanic, on the operations of the mechanical department and the relations of that department to the other branches of the company's organization. Following this there were brief discussions of several phases of the work of the mechanical department, comparing horse-car days with the present. The meeting was then turned over to the entertainment committee, which had provided a number of surprises. A Christmas tree had been set up in the meeting room and Attorney Frank J. Hogan distributed gifts with accompanying appropriate witticisms, convulsing the audience with laughter. Wilson buttons were presented to very good Republicans, hair tonics and combs were distributed in quarters where they were hardly required. Cradles for the newlyweds, rattles for the playful, and a small bowl and shovel for the professional alibi producer were among the gifts. There were also character sketches presented by a local entertainer, and at the close of the meeting a buffet luncheon was served.

A Plea for Clean Stations

Tram-o-Grams, published by the Denver (Col.) Tramway, contained in a recent issue the following appeal:

"The boy stood in the Tramway Loop, eating peanuts by the scoop; the empty shells he scattered round, four thousand shells to a single pound. There in the Loop the junk lay prone, 'midst remnants of an ice cream cone, cigars, torn paper and banana skins, lacking only tomato tins to make it look like Hogan's Alley after a family reunion rally.

"And then some gink in the Tramway got up nerve enough to bray: 'Perhaps this Loop would cleaner be, more like what we'd like to see, if we put in a big waste can to hold this trash for th' old rag man.' The can is labeled: 'Keep City Clean,' and that is something we take t' mean applies to ice cream cones and shells strewn by the boy from Cheyenne Wells. Help keep the Loop neat, spick and span, by throwing trash in the big tin can. PLEASE!"

Some Recent Advances in
EQUIPMENT AND ITS MAINTENANCE

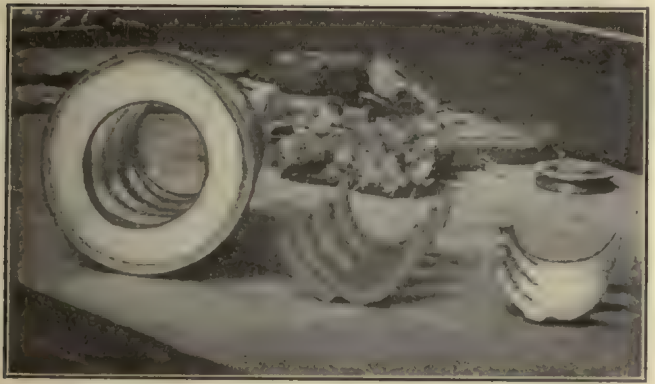
This Week Three Master Mechanics Give Practical Suggestions for Reducing Maintenance Costs—The Power Plant Operator Will Also Find Valuable Information Regarding the Steam Turbine and the Return Tubular Boiler

(Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.)

Bronze Insert for Armature Bearings Saves Stripping

BY A. BLANCHARD
Master Mechanic Boston & Worcester Street Railway

Stripping of armatures by contact with pole pieces on GE-57 motors has been practically eliminated on the Boston & Worcester Street Railway by casting a bronze insert, as shown in the accompanying halftone. This insert is of the same composition as the journal brasses used by the company, and it consists of a casting of approximately semi-cylindrical shape, with curved lugs on each side, around which the babbitt is poured when forming the bearing. The usual boring out to diameter with smooth interior surface follows the casting. In case the bearing overheats and the babbitt melts, the armature shaft is held in place and lubricated by the use of the bronze insert, which can be seen in the interior of the bearing as photographed. The bronze insert is of such composition that it will not cut the armature shaft.


BRONZE INSERT FOR BABBITTED BEARINGS

Fireproofing Cables in Manholes

BY "CONDUIT"

In the Nov. 18, 1916 issue of the Electric Railway Journal, page 1068, the writer was particularly interested in the article concerning the use of asbestos listing for fireproofing cables in manholes, protecting them against the explosion of adjacent cables, etc., and he noticed closely this statement: "If water ran in and covered the cables, the silicate (of soda) was dissolved and the asbestos loosened."

While it is true that water might have a slight softening effect on the silicate, nevertheless its softening effect is of very little consequence, and where the asbestos has become unfastened, this is readily taken care of on inspection by the application of a piece of tape. The writer of the article in question also stated that "when material as expensive as asbestos is used some provision should be made for salvaging the covering when it is removed from the cable." Most of the silicate of soda can be removed from the asbestos listing by the following method:

Make a solution of carbonate of soda by using 10 lb. of soda ash in 100 lb. of water. Do not use a galvanized iron vessel, as the solution will attack the zinc. Iron is best, but a wooden vessel or tank would answer. Keep the solution near the boiling point, which can be accomplished by the use of a steam line. Immerse the asbestos in this solution for about two hours, or until the asbestos is sufficiently pliable, then rinse well in clear water and allow it to dry.

The solution is not expensive to make and can be used over and over until it fails to give results within a reasonable length of time. Workmen should not put their hands in the solution. A wooden stick or iron rod could be used to agitate the solution and to remove the asbestos.

Exacting Inspection a Good Investment

The Author Describes an Effective Plan of Keeping Oiling and Repair Records and of Placing Inspectors on a Basis Which Promotes Vigilance

BY K. L. WILCOXON
Lately Master Mechanic The Chicago, Lake Shore & South Bend Railway, Michigan City, Ind.*

Just how far it is feasible to go in the inspection of cars is somewhat dependent on the value of the equipment likely to be damaged as the result of wear which becomes too great between inspections for safety. For instance, the Chicago, Lake Shore & South Bend Railway, with its very large and heavy single-phase motor equipment can afford to be more vigilant in its inspection routine than could a short direct-current road with comparatively much cheaper equipment. If this road by frequent and careful inspection can save one armature in six months from getting down on its bearings and being seriously damaged, the saving will pay an inspector's wages for a considerable period. This is one of the reasons why this company is investing more than the usual amount in keeping an inspector at both ends of its 76-mile line and rigidly maintaining the practice of placing every car over the pit at each end of the line after every trip. As the car comes into the terminal—Pullman at one end and South Bend at the other—it is run over the pit and another car is pulled out of the yard to take the return trip. Each car thus

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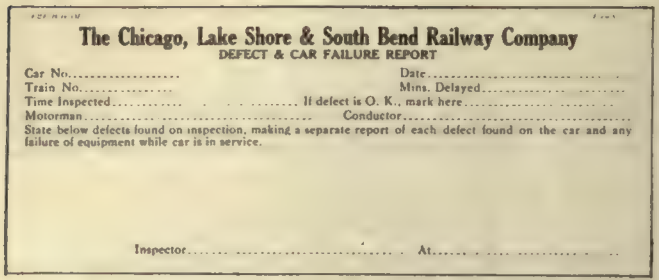
*The approving of this article for publication was one of the last acts of Mr. Wilcoxon, who met his death on Nov. 22. A note to this effect appeared in the issue of the Electric Railway Journal for Dec. 2.



The Chicago, Lake Shore & South Bend Railway Company
DEFECT & CAR FAILURE REPORT

Car No.................... Date........................ .... .
Train No................ Mins. Delayed............. ....
Time Inspected........... . . . . If defect is O. K., mark here............... ....
Motorman........... .... Conductor..................................
State below defects found on inspection, making a separate report of each defect found on the car and any failure of equipment while car is in service.

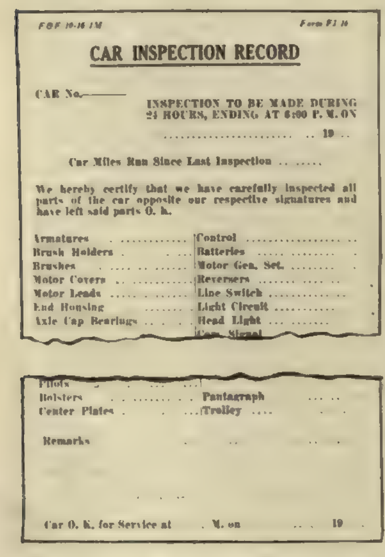
Inspector...... .... At..... . ...

FIG. 1—FORM USED BY INSPECTORS FOR REPORTS

lays over one hour while the inspector goes over it, makes out his report and "O.K.'s" it for the next run.

The complete inspection system includes one inspector at each end of the line for light repair work, and a crew of four inspectors at the centrally located shops at Michigan City, where each day's program includes the thorough general inspection, oiling and cleaning of three motor cars and two trailers, this number of cars coming in each day on a 1000-mile inspection basis. With these three points of inspection on the system, a plan has been evolved whereby the two ends are worked against the middle, so to speak, as the work of the shop inspectors is a check on the two end-of-the-line inspectors, and these two are also a check on each other, all reports clearing through the master mechanic's office. This is brought about by requiring each man to send in a signed report card covering his inspection of each car. Certain minor defects which are allowed to be passed by the Pullman and South Bend inspectors must appear in the reports of all inspectors, if their work is as thorough as it should be, and any failure to make such report by one, when it is reported by another, gives the master mechanic evidence of the grade of work being done by the several men involved. The system in detail is as follows:

The men at South Bend and Pullman have as their duty the finding of any trouble or near trouble, but not its removal unless it involves such light repairs as the replacing of a brakeshoe, a motor brush, etc., They look out for the brake adjustment, armature clearance, hot bearings, etc. As they go over the car they write out a separate report on the form Fig. 1 for each defect, and note if any supplies, such as signal fuses, markers, lanterns, etc., are missing and replace them. This same form serves the trainmen to make their trouble reports on. These reports are sent in to the master mechanic's office at Michigan City on the last car at night. The next morning the four inspectors in the Michigan City shops go onto the cars which are in for general inspection and any defective car, and their report when turned in to the master mechanic gives a check on the work of the men at the ends of the line by comparison of the several reports. This arrangement puts the men in competition with each other and thorough conscientious work obtains.



F&F 10-16 1M Form F1 16

CAR INSPECTION RECORD

CAR No.———

INSPECTION TO BE MADE DURING 24 HOURS, ENDING AT 6:00 P. M. ON
.... 19 ..

Car Miles Run Since Last Inspection .. ..

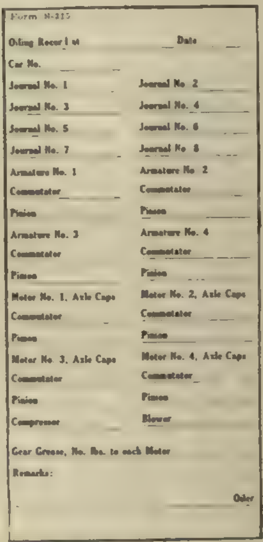
We hereby certify that we have carefully inspected all parts of the car opposite our respective signatures and have left said parts O. K.

Armatures . ... | Control ....
Brush Holders . . ... | Batteries ....
Brushes . ... | Motor Gen. Set. ....
Motor Covers .. .. | Reversers ....
Motor Leads .... | Line Switch ....
End Housing .... | Light Circuit ....
Axle Cap Bearings .. . . | Head Light ... .
Com. Signal

Pilots . . ..
Bolsters . . .. Pantagraph .... ..
Center Plates . . ... Trolley .... . .

Remarks . .. .. .

Car O. K. for Service at . M. on .. . 19 .



Form N-215

Oiling Record at ___ Date ___

Car No. ___

Journal No. 1	Journal No. 2 ___
Journal No. 3	Journal No. 4 ___
Journal No. 5	Journal No. 6 ___
Journal No. 7	Journal No. 8 ___
Armature No. 1	Armature No. 2
Commutator ___	Commutator ___
Pinion	Pinion ___
Armature No. 3	Armature No. 4
Commutator	Commutator ___
Pinion	Pinion ___
Motor No. 1. Axle Caps	Motor No. 2. Axle Caps
Commutator ___	Commutator ___
Pinion	Pinion ___
Motor No. 3. Axle Caps	Motor No. 4. Axle Caps
Commutator	Commutator ___
Pinion	Pinion
Compressor	Blower

Gear Grease, No. lbs. to each Motor

Remarks:

Oiler

FIG. 2—FORM FOR 1000-MILE INSPECTION REPORTS: MATERIALS RECORD ON BACK; FIG. 3—FORM FOR KEEPING CAR-OILING RECORD

The general inspection on the 1000-mile basis in the shops is divided between the four men in the crew. They go onto a car, each inspecting certain parts of it and making his report on the car inspection record, Fig. 2. The report of all four men is put on the one card, and each signs his name, checking off as O.K. his part of the work as he finds it in good condition or makes repairs. On the back of this same card is printed a list of all material likely to be used, and the men check off on this what they use and note the quantity. With these signed cards, it is a very simple matter to check back the source of negligence among the shop men in case a car goes out and fails on the road. When the work of the four men is completed on a car, the foreman writes in on the card the time O.K.'d for service and the number of miles run since the last inspection, signs his name and turns the card in to the master mechanic's office.

REPORT OF MISCELLANEOUS CAR TROUBLES

	January	February	March	April	May	June	July	August	September	October	Total
Armatures rewound	1	0	0	0	0	1	0	0	1	1	4
Armature trouble	0	3	0	0	0	3	1	2	3	3	15
Motor field trouble	1	0	0	2	3	1	0	1	1	2	11
Brushholders broken	0	0	0	0	0	0	0	0	0	0	0
Transformers and wiring	0	0	0	1	0	0	1	1	0	1	4
High-tension cable	1	2	0	0	1	2	1	3	1	0	11
Pantograph and trolley ins	2	0	0	2	3	5	2	4	1	0	19
Reversers and wiring	1	0	0	0	1	2	1	0	0	0	5
Switch group	2	1	1	0	0	0	0	0	1	0	5
Line switch	0	0	0	0	0	1	0	0	0	0	1
Air compressors	0	0	0	1	3	0	2	0	0	0	6
Hot bearings	2	2	2	6	3	2	9*	0	1	1	28
Head light	1	0	0	0	0	0	0	0	0	0	1
Broken gears and pinions	0	0	0	0	0	0	0	0	0	0	0
Car bodies damaged	0	2	1	2	0	0	3	1	2	2	13
Motor truck trouble	0	0	0	1	0	0	0	1	0	0	2
Speed relay	0	0	0	0	0	0	0	0	0	0	0
Preventive coil	0	0	0	0	1	0	1	2	1	0	5
Control wiring	0	1	1	1	1	0	0	0	0	0	4
Pantograph trouble	1	0	0	0	0	0	1	2	1	1	6
Flat wheels	0	0	1	0	0	0	0	0	0	0	1
Total failures	12	11	6	16	16	17	22	17	13	11	141

*High number caused from a run of defective bearing metal.

The oiling on the system being done on the 1000-mile basis, naturally goes hand in hand with the general inspection. This is done entirely at Michigan City. It is entrusted very largely to a man old in the company's service, who is paid a trifle more than usual for this class of work in order to keep him interested. The oiling of the cars is governed entirely by gaging the amount in the wells and the amount put in each bearing is recorded by this oiler on a card, Fig. 3, for record and file in the master mechanic's office. The packing of axle, armature and journal bearings is left to the oiler, who keeps a record on a blackboard ruled for the purpose and placed on the wall out in the shop. A space on the blackboard is provided for each car and the car number painted in the space. Opposite the car number the oiler writes in the date he packed the bearings so that the next time the car is in he can refer to the board to know just what attention he gave it on the previous inturn.

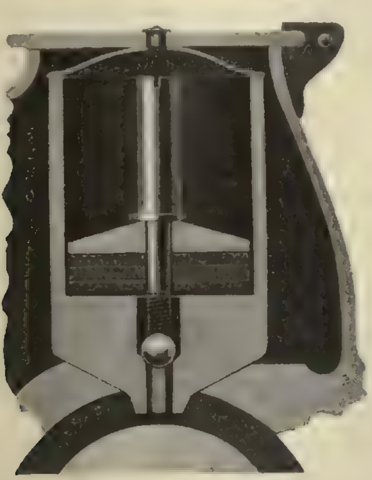
These several inspection and oiling record cards used on the system are filed in the master mechanic's office in two pigeon-hole cabinets fastened on the wall, one for the oiling records and one for the inspection reports. In these, a pigeon hole is allotted to each car and the car number painted on the front.

The result of this rigid inspection work is reflected in the table on page 1306 of equipment failures during the ten months ending Oct. 31, 1916, and also by the knowledge that during last summer the inspectors at the ends of the line caught a number of armatures low on their bearings which would have been damaged by another trip were it not for this frequent inspection. The mileage of the cars during these ten months was 1,231,338 and the miscellaneous car troubles which developed were as listed in the table.

Oil Cup for Lubrication of Old Type Motor

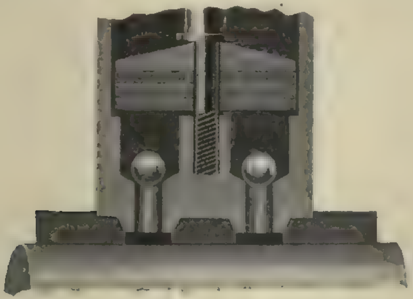
BY E. W. ELGEE
Master Mechanic Cumberland County Power & Light Company, Portland, Me.

For the purpose of permitting the use of oil instead of grease for the lubrication of the armature bearing of a G.E.-80 motor, the oil cup shown in the accompanying illustrations has been devised by the writer, and it is in successful operation on this road.



OIL CUP FOR OLD TYPE ARMATURE BEARINGS

This oil cup consists of a cast-iron square box in the bottom of which is a felt pad through which the oil works into the two wells which form part of the bottom of the box. The flow of oil through the pad is regulated by means of a threaded screw and a heavy iron washer which rests on the felt pad. Varying the pressure on the pad by turning the screw changes the flow of oil, since the more the felt is compressed the slower the oil can work through it. From the wells the oil drops on to the bearing through two ports which are closed by steel balls when the motor is still. The movement of the motor displaces these balls and allows the oil to reach the bearing. The oil cup rests on the bearing and is held in position by a flat spring which presses against the top lid of the bearing housing.

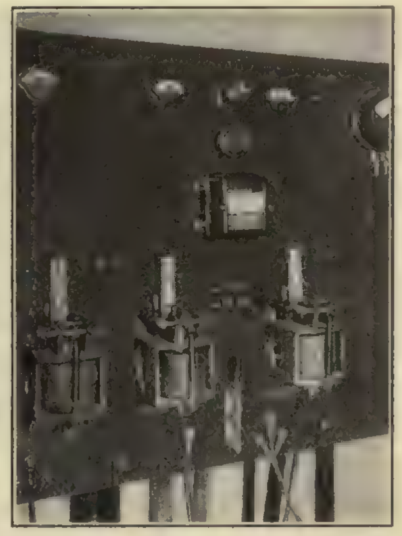


LONGITUDINAL SECTION SHOWING DETAILS OF OIL WELLS

A Constant-Current Arc Welding System

Regulator Is Used to Maintain Constant Current and Prevent Overheating at the Weld

In an attempt to reduce the waste of power and improve the conditions at the arc for welding, a new system has been brought out by the Electric Welding Company of New York. This company has been in the welding business for a number of years. The welding arcs are wired in series and power is supplied from a motor-generator set, which includes a regulator for maintaining the current at any predetermined value. At each arc is an automatic regulator which performs two functions. In the first place, it maintains the continuity of the circuit, and, in addition, controls the amount of heat which can be put into the arc. The controller operates by automatically adjusting resistance in shunt with the arc, utilizing the variation in voltage across the arc as the ultimate controlling element.



AUTOMATIC ARC HEAT CONTROLLER AND INSTRUMENTS

In the series circuit switches are located at such points as may be suitable for welding and an arc controller is plugged across a switch when welding is to be done at any point. The accompanying illustrations show the regulator and generator driven by the motor, and also a panel containing the controller and switch together, with the measuring instruments.

SELF-REGULATING GENERATOR FOR ARC WELDING

The manufacturers claim for this equipment that not only are the usual large losses in ballast and distribution lines eliminated, but the arc does better work because it is steady and cannot be drawn out to excessive lengths. It can also be extinguished by short-circuiting. For the purpose of extending the use of this apparatus a special company known as the Arc Welding Machine Company, New York, N. Y., has been formed quite recently.

Steel Lockers Reduce Fire Risk

Wooden lockers are unsanitary and, since greasy overalls, waste and similar materials as well as the mechanic's smoking supplies are often crowded into them, they are the cause of serious fires. Steel lockers are a great improvement. Besides being fireproof they are more easily kept clean, ventilation can be readily provided, and they are proof against rats.

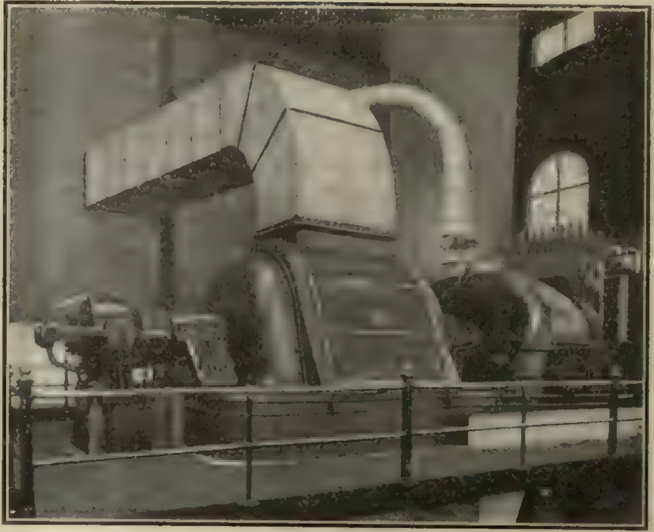
The accompanying illustration shows one of the lockers made and used in the shops of the Galveston (Tex.) Electric Company of which M. B. Osborne is master mechanic. It is built of heavy iron screen supported by a steel frame and tilted so that the doors will close themselves. The use of the screen insures good ventilation, and practically everything in the locker is visible without opening the doors. Three of these lockers have been built by this railway, one for the head machinist, another for the blacksmith, and the third for the storage of lubricants.

STEEL LOCKER BUILT AND USED IN THE RAILWAY SHOPS, GALVESTON, TEX.

Largest Steam Turbine in Virginia Was Rapidly Installed

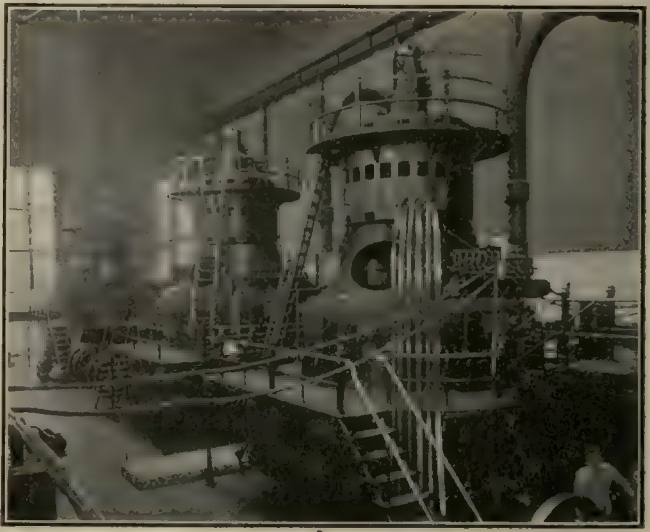
The Reeves Avenue power plant of the Virginia Railway & Power Company, Norfolk, Va., formerly contained three 4000-hp. turbines and one 2000-hp. turbine, all of the vertical Curtis type. The foundation of the 2000-hp. unit had been so constructed as to permit the installation of another 4000-hp. unit in its place. The appearance of the section of the turbine-room containing the 4000-hp. units is shown opposite. As light and power demands increased it became necessary in 1915 to add to the capacity of the plant. An order was therefore placed with the General Electric Company, for a horizontal turbine of modern design to be rated at 12,000 kw. to replace the 2000-hp. unit, and to occupy practically the same floor space as the small one which was to be removed. The rapid progress of the installation is shown in the following table:

Contract for turbine signed	Sept. 2, 1915
Removal of old turbine begun	March 15, 1916
First car of machinery arrived	July 6, 1916
First turbine parts arrived	Aug. 1, 1916
Turbine running with load	Sept. 13, 1916


12,000-KW. TURBINE WHICH REPLACED OLD 2000-HP. TURBINE, VIRGINIA RAILWAY & POWER COMPANY, NORFOLK, VA.

Just one year and eleven days from the signing of the contract and one month and twelve days after the arrival of the first car of turbine parts the machine was in operation carrying a load of 9000 hp. In view of the statement made in a recent issue of this paper to the effect that turbines must now be ordered for 1919 delivery the above table is doubly significant.

The turbine is designed for operation at 200 lb. steam pressure and 150 deg. of superheat and is of the condensing type. It is direct connected to a 60-cycle, three-phase alternator rated at 11,000 volts. A view of the new unit as it now stands in the station is given in an accompanying illustration. The condenser has 19,600 sq. ft. of condensing surface. The pump for circulating water is connected on one side to an electric motor and on the other to a small steam turbine, thus being doubly guarded against interruption in operation. The condenser and accompanying apparatus were furnished and installed by the Alberger Condenser Company. The boilers were designed for a larger output than that of the original turbines, and as the efficiency of the machine just installed is high compared with that of the old machines, the boilers proved to be large enough to supply the present demand. With the installation of the turbine a new section of busbar was added to that already in place and the two sections

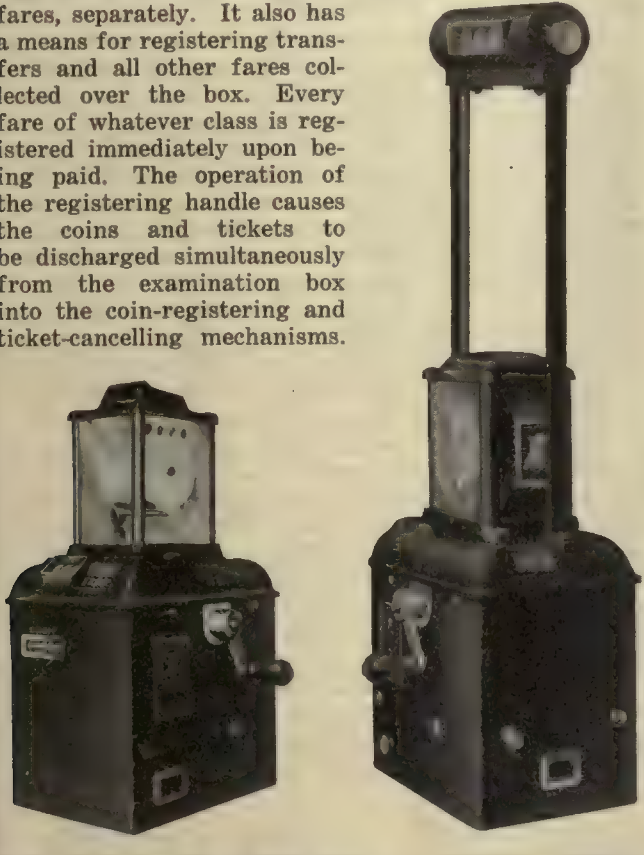

VIEW OF THE THREE 4000-HP. TURBINES IN THE REEVES AVENUE STATION, VIRGINIA RAILWAY & POWER COMPANY, NORFOLK, VA.

were connected in the form of a ring. The feeders were arranged so that they can be supplied from more than one place on the ring. This permits any section of the bus to be cut out for repairs without interrupting the service. J. P. Keeney is chief engineer in charge of the station, and the installation of the new unit, with the related changes in the electrical switching arrangements, was carried out under his supervision.

Combination Fare Box Registers

New Design Fare Box Registers and Cancels Tickets and Counts Coin

A combination coin and ticket fare box and fare register has been designed by the American Railways Equipment Company, Dayton, Ohio, which collects and registers coins and paper tickets as received direct from the passenger through a single opening and drops them into the same examination box. The mechanism of the fare box is so designed as to separate the coins and tickets, and register the trip fares and total fares, and the value of the cash fares, separately. It also has a means for registering transfers and all other fares collected over the box. Every fare of whatever class is registered immediately upon being paid. The operation of the registering handle causes the coins and tickets to be discharged simultaneously from the examination box into the coin-registering and ticket-cancelling mechanisms.


FARE BOXES OF NEW DESIGN, WITH AND WITHOUT OVERHEAD TRIP REGISTER

By this same operation the trip-passenger and total-passenger registers are actuated to register one unit with each movement of the handle, serving to indicate at all times on the respective counters the full passenger load and the total registration. The same operation also delivers the tickets through the cancelling mechanism into a locked box and carries nickels and dimes through the coin-registering mechanism, which automatically registers the value of the coins. The latter then pass into a change drawer, where they are accessible to the conductor. Pennies and mutilated coins are segregated from full fare coins and are deposited in a locked box. Each operation of the hand lever causes a bell to ring to indicate a fare registration.

This registration of each fare as it is paid is claimed to prevent accumulation of fares in the registering mechanism, and also to permit of a complete registration of the full passenger load on each trip, and total passenger registration, without using a separate register. This enables the conductor to give his undivided attention to the fare box upon which all fares, whether collected through or over the box, are registered. The trip-passenger register is so located on the fare box that an inspector upon entering the car and paying a fare can read it at a glance. He can then check all fares paid and all fares registered while he is on the car by observing passengers taken on and by noting the fare box bell. By this arrangement, it is claimed, every requirement of prepayment fare collection is provided for in a simple, single-unit machine which requires but one operation for each fare paid, and which safeguards ticket fares as fully as cash fares by registering and cancelling them through the fare box without intermediate handling.

The construction and appearance of the new fare box are similar to those in present use. The box may be operated by turning a handle or if desired by means of a treadle mechanism. The working parts are of simple construction and made of hardened steel, and the casing is of enameled steel. The fare boxes will be furnished in three types: the complete coin-ticket registering fare box as described, a coin-registering fare box without the mechanism for handling tickets, and a locked-box type, which is the same as the box described, except that the mechanism for registering the value of coins is omitted. The first fare boxes of the different types will be ready for delivery in February, and will be installed at that time in cars of representative railway companies preliminary to filling orders.

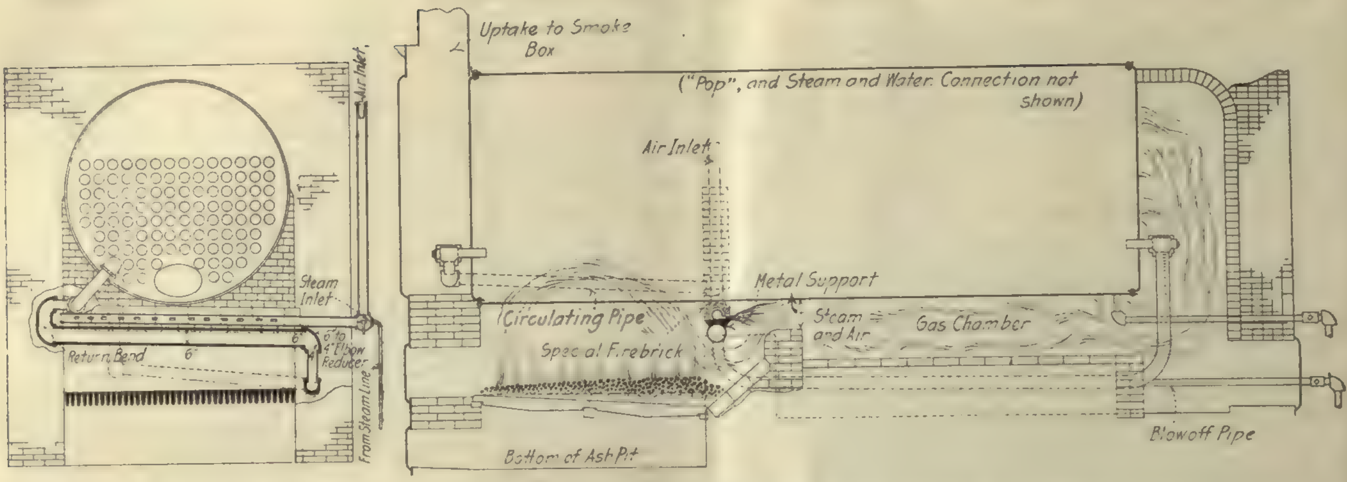
Increasing the Capacity of Return Tubular Boilers

A furnace system for return tubular boilers, which utilizes a steam jet for furnishing a supply of air to the combustion chamber of the boiler for the purpose of minimizing smoke, has recently been placed on the market by the United Furnace Corporation, 120 Broadway, New York, N. Y. In addition the general scheme includes the installation of circulating piping.

In applying this system one of the tubes is removed and a tee connection is made to the shell, a 4-in. pipe extending to the end of the grate bars, where it is joined to a 6-in. pipe by means of a 6-in. to 4-in. return bend reducer. The 6-in. pipe extends across the grate and is joined to a 4-in. pipe by means of a 6-in. to 4-in. reducer. This pipe runs diagonally across the bottom of the combustion chamber, and through a riser with tee connections at the top and bottom connection is made with the rear of the boiler, completing the circulating system. The cross pipe and that portion of pipe which extends over the grate are directly exposed to the hot flames and gases, thus causing the water to circulate rapidly.

Just in front of the bridge wall a baffle wall is constructed so that the flames will be forced up against the boiler shell at the extreme end of the grate. The air and steam from a header are combined with the gases at the point where they pass over the bridge wall, as shown in the accompanying illustration, and thus produce better combustion than is possible under ordinary furnace conditions.

As shown in the elevation of the boiler at the left of the illustration, the air inlet to a header, which is closed at one end, is tapped at the ell and a connection is made with a $\frac{3}{8}$-in. steam pipe in the line of which is a globe valve. Steam is injected at the point from a steam drum or steam line and induces the air flow. This



SCHEME FOR OBTAINING COMPLETE COMBUSTION AND RAPID WATER CIRCULATION APPLIED TO A RETURN TUBULAR BOILER, SHOWING PIPING AND PATH OF GASES

header, which has approximately the area of a $3\frac{1}{2}$-in. pipe and is inclosed in a firebrick cap, has openings facing the bridge wall. It rests on a saddle which supports the baffle wall, the cross pipe being directly below the saddle. The edges of the openings in the header are curved and smooth so that the friction of the air and steam passing through the openings will be small. The amount of air drawn in at the air inlet is controlled by the globe valve in the steam line, and the amount of air and steam which combines with the gases in the combustion chamber is regulated until a smokeless condition of the fire is obtained.

A number of reports of tests have been received showing considerable economies obtained in industrial and municipal lighting and power plants where this system is in use. According to the claims of the maker its use will produce fuel saving of at least 10 per cent and a material increase in the water evaporated per pound of coal. The boiler furnace will also be rendered smokeless, as is required under many city ordinances in localities where bituminous coal is burned.

According to the last report of the American Railway Engineering Association there are in use on fifty-six railroads in this city, 65 per cent of the total, electric motors to the number of 16,992, with an aggregate capacity of nearly 300,000 hp. Of the motors reported those using direct current represent 52.4 per cent in number and 47.4 per cent of the total horsepower. Three-phase motors constitute 39.9 per cent of the total number and 45.3 per cent of the total horsepower.

Demand Meter Operated on New Principle

A new type of demand meter used in connection with a watt-hour meter, which records graphically the energy consumption during a definite time interval, has been developed by the General Electric Company.

Essentially it consists of a demand-registering element and a timing element. The demand-registering mechanism is actuated when a cam in the watt-hour meter closes the circuit of an electromagnet in the demand meter. The armature of the electromagnet moves forward turning the ratchet wheel by means of a pawl, which may be seen at the right in the accompanying diagram. When the circuit is opened a spring returns the armature lever and pawl to their original positions. The motion of the ratchet wheel is transmitted through gearing to the pointer, moving it forward for each closing of the circuit until the end of the time interval is reached. At this point a cam driven by the timing element causes a trip lever to disengage a sliding pinion from the gear with which it mashes, thus opening the gear train and allowing a spring to return the pointer to the zero position. Further rotation of the cam returns the sliding pinions to its former position and re-establishes the gear train. The mechanism is now in a position to measure the energy consumption during the next time interval. These meters are built both indicating and graphic, a view of each being shown in the illustration below, and for alternating and direct current, with time intervals of fifteen, thirty or sixty minutes.

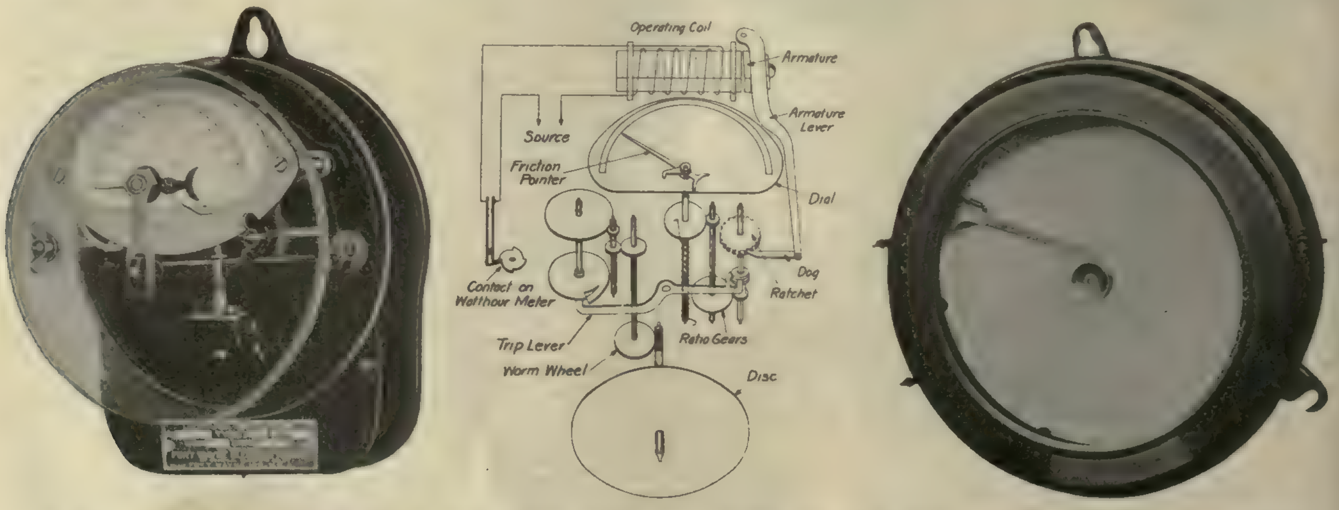


DIAGRAM SHOWING MECHANISM OF INDICATING METER AND VIEWS OF INDICATING AND RECORDING DEMAND-METERS

NEWS OF ELECTRIC RAILWAYS

Traffic and Transportation
Financial and Corporate Personal Mention Construction News

OFFER TO ELECTRIFY CHICAGO SUBURBAN LINES

Electrification Plans Include Subway Under Grant Park for Joint Use with Local Transportation—Work to Be Completed Within Five Years, Dated from Time Construction Begins on New Twelfth Street Station

An ordinance has been prepared by the Illinois Central Railroad and presented to the Chicago Terminal Commission which proposes the electrification of the company's suburban service from Randolph Street south to the city limits on the main line, and a portion of this beyond the city limits as far as the Matteson Station, and three branches to South Chicago, Blue Island and Kensington. This electrification plan comprises only a small part of the proposed ordinance which takes up the consideration of establishing harbor district No. 3, securing park development, bathing beaches and streets over the tracks communicating with these, and providing for the new passenger station at Twelfth Street, and other public advantages and benefits—points of vital importance to the Illinois Central Railroad in connection with its occupancy of the lake front. The complete ordinance includes concessions on the part of the city and company, among the latter being the electrification plan.

Among the concessions asked of the city are permission to construct a four-track subway not over 100 ft. wide, beneath Grant Park from Twelfth Street north to Monroe Street, and a loop in the territory between Monroe and Randolph Streets, and between Michigan Avenue and the present right-of-way of the Illinois Central Railroad. The right is also asked to construct track for storage of railway passenger equipment within the last-named territory. Provision is then made in the proposed ordinance that any right as to the use of the space beneath the surface of Grant Park between Monroe Street and Randolph Street shall be subject to joint use as a part of any subway system of transportation that may be constructed by the city or its licensees in this territory. The plan for such joint use and the compensation to the Illinois Central Railroad for the use of its track are to be agreed upon between the city or its licensees, the park commissioners and the Illinois Central Railroad.

The electrification plans are not made to include the through-train service coming into the Twelfth Street Station, for the reason that it is considered vital to the possibilities of the new Twelfth Street terminal, that provision be made whereby other railroads may use this new station. It is expected that some of the railroads now using the Dearborn and La Salle stations will use the new lake front station, but if the service into this station was completely electrified, this would prevent these roads from coming in, at least for a number of years, or until complete electrification of railroads around Chicago was consummated. For this reason the proposed ordinance of the Illinois Central Railroad plans that the through trains will still be brought into the station under steam power.

GALVESTON CAUSEWAY RECONSTRUCTION DECIDED

Galveston County, the Galveston-Houston Interurban Railway and the three steam railroads entering Galveston, Tex., over Galveston Bay will soon award contract for the restoration of the Galveston Causeway, destroyed in the storm of August, 1915. The new structure will be of concrete-arch construction all the way across the bay, and the work will be done at an estimated cost of $1,500,000. The style of architecture to be employed was decided on by a board of arbitrators as agreed by all parties at interest. The members of the board were: George F. Swain, Boston, selected by Galveston County and the interurban railway; Arthur N. Talbot, Urbana, Ill., selected by the three steam railways, and Lincoln Bush, New York, chairman of the board, who was selected by the other two members. The type of construction will be similar to the concrete portion of the causeway that was left standing after the 1915 storm. The length of the portion left standing is 2446 ft., making the total length more than 8000 ft. Of the estimated cost of $1,500,000, the three steam railroads will pay 55 per cent, Galveston County will pay 33 per cent and the Galveston-Houston Interurban Railway 22 per cent.

OFFICIAL STATEMENT REGARDING RUMORED BALTIMORE CHANGES

In connection with the recent reports concerning the possibility of an election of a new president of the United Railways & Electric Company, Baltimore, Md., to succeed William A. House, so much has been said in the press of Baltimore that is entirely incorrect that, after conferences with George J. Jenkins, of the Jenkins interests, and C. E. F. Clarke, of Aldred & Company, the management of the company through B. Howell Griswold, Jr., a member of the banking firm of Alexander Brown & Sons, Baltimore, made public on Dec. 20 a statement in regard to the situation. This statement follows in part:

"It seems to us that many people have failed to recognize the fact that Mr. House has been for many years a very hard working and loyal official of the United Railways. He has given the best that is in him to its service and has been on the job night and day. The directors have recognized this fact and from time to time have cautioned him, but it was not in his temperament to share his work or responsibility. The result has been that at times he has been under very severe nervous strain.

"It is only natural, then, that some suggestion should be made in his interest, as well as that of the company, which would compel him to give up the detail work which is now wearing him down and at the same time reserve the benefit of his long experience and activity for the company. We say it is not surprising that such a suggestion should be made, but we want to repeat that no such suggestion has been adopted.

"The story grows out of the creation of a committee appointed by the board for the purpose of bringing the company into closer touch and better relationship with the public and with all public officials. This committee has not yet reported. When we say that the committee has not yet formulated its report, that it does not know that the report when formulated will be adopted by the board, it will be seen how purely conjectural are all of the somewhat positive statements which have been made about what is going to be done in the United Railways. It can be positively stated that the presidency of the United Railways has not been offered to anyone.

"As for the statement often made recently that Mr. Aldred dominates the policies of the United Railways, anyone who really knows the situation knows that this is incorrect. His interest in the United is proportionately small. Since his election to the board and executive committee Mr. Aldred has attended very few meetings, owing to the pressure of duties elsewhere. There has been nothing but the most complete harmony in the board. The company, since the fire of 1904, has spent many millions of dollars for the improvement of its service. These improvements were inaugurated by and carried out under the supervision of the board which, practically without change of membership, has directed the policies of the company for many years past. This board is fully alive to the recent developments in our city and can be relied upon to further in every way the city's development."

WILKES-BARRE STRIKE SETTLED

Fourteen Months of Terror Ended by Employees Accepting Terms Secured by the Mine Workers

The Wilkes-Barre strike, in progress since Oct. 14, 1915, is at an end. The settlement was brought about by the men formerly in the employ of the Wilkes-Barre Railway voting to accept the terms of settlement proposed by the mine workers. Two ballots were necessary. At the first the men rejected the proferred terms by 111 to 108. There was a further parley, and after T. A. Wright, vice-president and general manager of the company, had consented to a few minor changes the men voted again on Dec. 16 and then made unanimous their decision to accept the terms of settlement. These terms follow:

"1. That 190 trainmen be taken back at once; of this number as many as possible, not less than 130, be given regular runs, the remainder to be placed on the extra list, and of the latter, those reporting twice daily for work to receive one dollar a day, and more if earned.

"2. That the remainder of the trainmen who were in the employment of the company at the date of suspension of work, except as hereinafter stipulated, shall be placed on a waiting list to be called for as vacancies occur, and to be given fifteen days' notice in which to return.

"3. The company to agree with Division No. 164 of the Amalgamated Street Railway Association that a committee representing said employees be permitted to divide the time of those men who are taken back and given regular runs with those men who are taken back and placed on the extra list, provided, always, that such substitution shall be arranged for not less than one week at a time.

"4. No new men to be employed until all of the old men taken back have been offered regular runs.

"5. The men to be taken back and given regular runs and put on waiting list shall be given runs upon such divisions as may be designated by the general manager, and the men to agree to accept such runs on such designated divisions. The seniority rights of the men so taken back and assigned to said divisions shall be maintained upon said divisions as such rights have been defined by former contracts between Local No. 164 and the company. It is understood that full seniority rights shall be accorded the men April 1, 1917, provided that at that time the general manager of the company shall decide that it is for the best interests of the company that such rights ought then to be restored. If seniority rights are not restored on April 1, 1917, the company to agree that such rights shall be restored as soon thereafter as in the opinion of the board of directors such restoration can be made to the best interests of the company and its employees.

"6. The wages to be paid all of the men taken back and given regular runs, from the time of their return until Jan. 1, 1917, shall be those which were paid the men by the company on Oct. 1, 1915.

"7. All suits against members of the labor movements and the injunction proceedings to be dropped by the company.

"8. No men to be taken back who by their personal acts have made themselves objectionable for re-employment. Objectionable personal acts shall not be held to mean mere membership in the Amalgamated Association or official connection therewith or membership on any committee.

"9. As of Jan. 1, 1917, a three-year working agreement in line with the agreement of Jan. 9, 1915, except as to Section 8 therein, and except as herein agreed, fully executed by the respective parties attached hereto shall go into effect.

"10. Wages to be paid for the three years from Jan. 1, 1917, to Jan. 1, 1920, to be 25 cents for first-year men, 26½ cents for second-year men, and 28½ cents for third-year men and over.

"11. When employing new or additional trainmen for car service that during the first two weeks of training they shall be paid the sum of $1 a day and during the third week shall be paid $2 a day. It is understood that applicants are not finally accepted for service until the expiration of the three weeks and only if then qualified.

"12. The men upon settlement to call off every action in opposition to the company and Local No. 164 by resolution to ratify the action of the executive committee in calling off the strike, and, also, by resolution to request the people to patronize the road and the men to use their honest efforts to restore riding upon the cars. The company to agree that there shall not be any prejudice held against any man taken back who went out on strike, nor any discrimination against such a man, nor any interference with or against him for his membership in the Amalgamated Association, and the men agree not in any manner to interfere with the present employees."

The terms of the peace pact were drawn up by the United Mine Workers. They are the ultimate in concessions that could reasonably be expected from the company, and the mine workers, looking at the matter from the third-party standpoint and realizing this, are said to have threatened to withdraw support, unfalteringly given for months to the men on strike, unless they accepted the peace proposal as contained in the agreement which was signed.

REVIEW OF CONTROVERSY

In all struggles similar to this that extend over any considerable length of time the original issues are submerged and lost sight of in the light of subsequent developments. Thus, in the Wilkes-Barre case the chronicle of events after the first few days turned from the main issues at stake to the disorder that followed, the boycott and its effect on trade, and other issues growing out of the struggle. For months now there has been nothing to report except such developments as concerned the local parties in interest, and on that account the strike has not been referred to in the ELECTRIC RAILWAY JOURNAL for some time past. The present account of the settlement, however, would hardly be complete without at least a brief review of the attending circumstances.

The corporation and its employees were bound by a working agreement that expired on Dec. 31, 1914. The company paid the men a flat wage scale of 24 cents and permitted a man to work as long per day as necessary. As the time for the termination of the agreement approached Dennis McCauley, president of the local union; Thomas Hatch, treasurer, and other members of a committee conferred with the railway representatives regarding the renewal of the contract. The men declared that they could not work under the terms of the old agreement, but wanted 32 cents an hour as a wage scale. After threatening to strike unless their demands were honored, the employees and the company finally reached a basis of settlement on Jan. 9, 1915. A new working agreement was drawn, in which both sides to the controversy decided that the men should be worked in shifts of nine hours, and that no motorman could work more than nine hours a day, unless conditions compelled the extra labor. The new pact also provided that when a man was suspended or discharged he should be permitted to ask for an investigation. He should have the right to be present personally and to have the charges against him made fully known to the employee. After this hearing the general manager was to decide whether or not the man was at fault. If guiltless, he was to be reinstated and paid for the time that he had lost through discharge or suspension. In case, however, that the decision of the general manager failed to meet the approval of the employees' committee asking an investigation, conciliators could be selected who would rule on the question. These mediators, it was determined, should be provided by the Secretary of Labor at Washington and the State Bureau of Labor and Industry. The matter of a wage scale was referred to arbitration. The new agreement was to exist for three years.

The decision to submit the wage scale to arbitration afterward became the nubbin of the controversy. It was distinctly provided in the agreement that "the decision of the board of arbitrators, or a majority of them, shall be final, and without appeal, and shall be binding and conclusive upon the said Wilkes-Barre Railway and said employees of said company."

The selection of the umpires was a matter that languished over months. The railway company chose Samuel D. Warriner of Philadelphia, president of the Lehigh Coal & Navigation Company. The men selected Thomas D. Shea, a lawyer of Wilkes-Barre. It was incumbent upon these arbitrators to select the third. Here came the hitch. Although several hundred names were submitted by both sides for the third umpire, none of these seemed to suit. This failure to agree on the third member bred an acute situation, which resulted in the men going on strike on April 1. Meanwhile the negotiations were pending. Finally John Price Jackson, State Commissioner of Labor and Industry, was chosen as the third arbitrator. The board was organized, and on April 10, 1915, the strikers returned to work. The arbitrators heard both sides to the controversy. Finally, on July 10, 1915, the arbitrators handed down their decision. All this while, pending a decision by the umpires, the men remained at work and accepted the old wage scale for the time.

The arbitrators' decision provided a sliding or graduated scale of wages. It stipulated that the carmen should be paid on the following scale: First-year men, 24 cents an hour; second-year men, 25; third-year men, 26; fourth-year men, 26½, and fifth-year men, 26¾ cents an hour. In addition, the men were to participate in a profit-sharing plan with the passenger revenue per car hour for the fiscal year ended Dec. 31, 1914, as the basis on which this new income was to be computed. This was $2.786. Under this decision from each 2½ cents additional revenue the motormen and conductors were to receive an additional compensation of one-fourth of a cent per hour.

This arbitration was retroactive and went into effect as of Jan. 1, 1915. The first two weeks of July were paid on the new scale, and on July 27 the corporation had a special payday, which gave to the men the increase to which they were entitled from the new year to the first of that current month. This amounted to $10,949.

Shortly after completing their duties, however, Samuel D. Warriner, the arbitrator for the company, received from Commissioner Jackson a lengthy letter, in which the latter declared that the arbitrators had not fulfilled their functions legally. The plaint of the local union men, it appeared, was that no sliding scale could be adopted by the umpires, as such a decision was not germane to the questions raised. In other words, as the old agreement provided for a flat scale, the arbitrators in determining whether or not the carmen were entitled to an increase could only have provided such an agreement as would have increased the wage scale based on the old flat rate.

Mr. Warriner replied that he agreed with none of Dr. Jackson's deductions, and that even if he were in accord with the commissioner's views the umpires were powerless to take further action. Mr. Warriner based this statement on his belief that once the arbitrators submitted their scale and findings, and these were accepted, the board automatically ceased to exist. For that reason any further consideration of the controversy would only be *ex parte* and have no judicial foundation or legal value.

Dr. Jackson then conferred with Attorney Shea, the umpire chosen by the men. On Oct. 1 they announced it as their unofficial opinion that the men should get 27 cents an hour for a flat scale. This was only a recommendation, the former umpires were compelled to state. For three days after the unofficial act the employees' representatives and the officials of the railway dickered over the matter and neither yielded. On Oct. 14, 1915, the strike was declared. To the company the whole issue lay in the refusal of the trainmen to abide by the arbitration.

SEATTLE COUNCIL ACTS AGAINST COMPANY

The City Council of Seattle, Wash., has passed a bill directing the corporation counsel to begin an action against the Puget Sound Traction, Light & Power Company to compel it to comply with the terms of its franchises, and pave its right-of-way at the time and with the same material as the rest of the street. Since the company petitioned the Public Service Commission of Washington to be relieved of certain of its franchise obligations because of impaired earnings, due in part to jitney competition, planking has been substituted for paving, pending a hearing on the petition. The 2 per cent gross earnings tax, from which the company also prayed to be relieved, has been paid under protest. The action of the Council in passing the bill directing the action stated is expected to be resisted by the company. The hearing on the part of the Public Service Commission of the original petition has been delayed because the commission has not completed the valuation of the properties of the company.

CINCINNATI TRAFFIC REPORT PRESENTED

More Than 25,000,000 Passengers Will Use Proposed Rapid Transit Loop Annually

Frank S. Krug, chief engineer, submitted to the Cincinnati (Ohio) Rapid Transit Commission on Dec. 15 a report of the traffic survey, made last August to secure information relative to the location and construction of the proposed loop. Mr. Krug estimates that 25,266,734 passengers will use the rapid transit loop annually.

Included in the survey is the area served by the Cincinnati Traction Company and the Ohio interurban lines entering Cincinnati, covering the city of Cincinnati, Norwood, St. Bernard, Elmwood Place, Cheviot, Wyoming, Reading, Lockland and Glendale. It is estimated that the traffic on all lines and interurban lines is 118,234,483 passengers of whom 106,629,830 are city surface line passengers and 11,234,483 are interurban passengers. The additional area that will be brought into the thirty-minute time zone from Fifth and Walnut Streets is greater than the area at present within that zone under existing conditions. The area of the territory now within the zone is 9242 acres and the population is 297,044, while that of the additional territory is 10,363 acres with a population of 59,876. Mr. Krug prepared a table showing the average time saving from the various sections to the intersection of Fifth and Walnut Streets, as compared with the present service. He pointed out that points where no time will be saved are within the loop and that here passengers will use the surface cars.

The report estimates that 51.2 per cent of the passengers using the loop will ride only on the east side of it; 39.4 per cent will ride only on the west side; 5.1 per cent will ride between the east and west side at the south end, passing through Fountain Square, and 4.3 per cent will ride between the east and west side at the north end between Paddock and Greenlee stations. A table is included in the report which gives an estimate of the rapid transit and interurban passengers boarding cars daily at rapid transit stations for both directions of operation from Fountain Square.

The estimate of interurban passengers who will ride annually in interurban cars over the loop is 1,854,644 for the east side of the loop, and 2,800,335 for the west side of the loop, making the grand total 4,654,979.

In making the estimates Mr. Krug assumed that the rapid transit cars will be operated locally at high speed and in train units of such length as the traffic may require, and that the interurban cars from all lines will be operated over the loop line to Fountain Square.

The final joint session of the Rapid Transit Commission and the conference committee from the Council committee on street railroads was held on Dec. 13. The question of whether it is necessary to receive competitive bids for the lease of the proposed loop was discussed. The opinion that the Cincinnati Traction Company should operate the loop seemed to prevail, in order that there should be a unified system. W. L. Woodward, chairman of the transportation committee of the Federated Improvement Association, also expressed this belief.

Attorney Henry Bentley insisted that competitive bidding was out of the question unless the City Council fixed a price on the property of the Cincinnati Traction Company. Mr. Bentley said he represented himself, but that a bid would be made if the terms were open to competition. Walter Draper, secretary of the Cincinnati Traction Company, said that a price would be made on its property, if Mr. Bentley wished to buy it. Charles Mayer, a real estate man, made a proposition to lease the east half of the loop and operate it at a rate of seven tickets for a quarter. He said the west half could be operated by the Cincinnati Traction Company in connection with the surface lines.

Chairman Edwards of the commission stated that he would begin the preparation of a proposition to the Cincinnati Traction Company at once, but first he would submit a list of questions in order to secure information needed in formulating the proposition. Mr. Draper informed him that the company was ready to consider a proposition and that action would be taken upon it as quickly as possible. He said the company had followed the discussions closely and already many of the points had been decided. If possible the lease will be submitted to referendum vote in April, 1917.

ST. LOUIS PREPARES COUNTER PROPOSAL

Summary of Unofficial Terms Which the City Feels Should be Imposed in the Traction Settlement

The counter proposition of the city of St. Louis, Mo., to that of the United Railways looking toward the settlement of all the differences between them was formulated and adopted by the committee on public utilities of the Board of Aldermen on Dec. 12. It will be submitted to the joint committee composed of city officials and representatives of the company at a meeting to be held in the near future.

It was not intended that the conditions as adopted by the committee should become public, but the newspapers secured and printed what purported to be an outline of the counter proposal of the city. These reports said that it was intended to limit the proposed new franchise grant to the company to twenty-five years for all lines; to determine the actual value of the property and limit the return to the company upon the basis of a fixed percentage on that valuation; to include in the grant a provision for the future acquisition of the company's property by the city; to dispose of any surplus earnings of the company over and above that needed for the guaranteed return to the company by dividing them between the city and the company, by allowing the employees to share in them, by placing the sum in a fund for the future development of rapid transit, by using it to accomplish a reduction in fares or by disposing of the surplus by some combination of the methods just mentioned; to limit the board of directors to twelve members with five from the city; to give the director of public utilities of the city general control over the service and operation of the company; to require the company to report to the city in accordance with conditions prescribed by the city; to charge in as operating expenses of the company all expenditures made by the city in connection with the affairs of the company; to continue the mill tax, the tax up to Dec. 31, 1916, with accrued interest to be paid to the city in annual instalments.

The committee on public utilities, which will make the above report, is composed of the following: Aldermen Eugene B. Gregory, chairman; William F. Otto, Adam Reis, Otto A. Hampe, Barney L. Schwartz, Gus A. Baur and Alfred Bergmann. Together with Louis P. Aloe, president of the board, and Richard McCulloch and Murray Carleton of the railways company, they were appointed a subcommittee, Nov. 22, by Mayor Kiel, to consider the proposition made by the company's officials to the board of estimate and apportionment and the public utilities committee.

Mr. Gregory, the chairman of the committee, was greatly displeased with the publication of the alleged terms of the tentative counter proposal from the city. He called off the meeting of the committee set for Dec. 14 and refused to be quoted as to when the committee would meet next.

Richard McCulloch, president and general manager of the United Railways, refused to discuss the report of the committee. He said that the matter had not come before him officially, and that to discuss it before such time would be an act of discourtesy to the committee. He did, however, discuss some of the details necessary for a readjustment of the capital liabilities of the company without the need for receivership and foreclosure.

In this connection, it is being urged in certain quarters that the present market value of the securities of the company which are outstanding furnish a good criterion as to the value of the company as a going concern. At present the United Railways and its constituents have outstanding more than $57,000,000 of bonds, $16,383,200 of preferred and $24,913,800 of common stock. As against these par values, however, current market quotations give these securities the present market value: Outstanding bonds, $36,450,000; preferred stock, $3,100,000; common stock, $1,000,000. Thus the securities outstanding with a par value of about $100,000,000 have a market value of only $40,500,000.

Ephrim Caplan, a member of one of the committees appointed in the interest of the security holders of the company, returned to St. Louis on Dec. 18 from New York after conferring with representatives of the North American Company, which controls the United Railways, through ownership of approximately $18,400,000 of the common stock of the company. Mr. Caplan announced that Horace Havemeyer, New York, and Charles C. Harrison, Philadelphia, had been added to the committee of which he is a member. The other members are August Heckscher, New York, and Charles S. Farnum, Philadelphia. Mr. Caplan said the committee represented nearly 30 per cent of the outstanding preferred stock. Included in the plan of the committee as laid before the North American Company, Mr. Caplan is quoted as saying, was the following program:

1. That the mill tax question should be settled in some manner.
2. That the franchise question should be adjusted.
3. That a radical change in the legal department of the United Railways must take place.
4. That fullest publicity and examination must be made of the power contracts to which the United Railways is a party, and that these contracts should be readjusted squarely for the benefit of the company.
5. That preferred stockholders should have representation on the board of directors.

The St. Louis *Post Dispatch* is publishing for the benefit of its readers brief reviews covering the terms and conditions of the recent traction settlements in Chicago, Kansas City and other places.

RAILWAY OFFICIAL LOST IN ADIRONDACKS

All the efforts have proved unavailing which were made to locate Carleton Banker, superintendent of the electric division of the Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y., who disappeared on Nov. 10 during a short hunting trip in the Adirondacks such as he was accustomed to take. On Nov. 7, in company with F. A. Bagg, chief engineer of the Fonda, Johnstown & Gloversville Railroad, and four other hunters, Mr. Banker went on a trip to Truman Lawrence's camp at Piseco Lake, Hamilton County, N. Y. On Nov. 10 Mr. Banker and Mr. Bagg packed into the "Foxy" Brown's camp, some 6 miles distant, to enjoy a few days in the company of Mr. Brown, with whom Mr. Banker had hunted and fished for twenty years. Friday morning, Nov. 10, the three men started to hunt, walking from 7 a. m. until about 3.30 p. m. Mr. Banker then complained of being very tired and was left by the other two at a certain spot, while they were to tramp around the northwest end of the Lunkazu Mountain, on which they were to make a drive to Mr. Banker.

After making the drive and returning where Mr. Banker had been left, Mr. Bagg and Mr. Brown found no trace of him and presumed that he had either returned to camp because of his fatigued condition or had followed the trail of a deer or bear. As darkness was fast approaching, Mr. Bagg and Mr. Brown returned to camp, staying for about an hour. They then started out to search for Mr. Banker, thinking perhaps he had become turned around and would signal to them. They roamed the woods where he was last seen, and fired signal shots until 11 p. m., but without getting a response of any kind to their signals. Mr. Bagg then walked to Piseco and gave a general alarm. Within a few hours searching parties to the number of 150 men had started in all directions. The searching extended over a period of six days, but was without result. To those who know the Adirondack wilderness, it is easy to understand how a man lost through straying, and overtaken by some physical ailment, brought about by fatigue, might lie almost within sight and touch and still be missed by the most painstaking searchers.

Carleton Banker was born in Fonda, Montgomery County, N. Y., fifty-six years ago. He was educated in the schools of that town and until he was about twenty-three years of age lived on the Banker farm at Fonda with his parents. He then went to Staley, Neb., which was at that time located on what was known as the Burlington & Missouri Railroad. His position with that company was as station agent and he remained in railroad work in the West until 1893, when he returned east to take up a position as general bookkeeper of the Cayadutta Electric Railroad, operating between Fonda and Gloversville. In 1903, Mr. Banker was made superintendent of the electric division of the Fonda, Johnstown & Gloversville Railroad upon the merging of the Cayadutta Electric Railroad with the Fonda, Johnstown & Gloversville Railroad. He was married and had two daughters.

CHARGE AGAINST EDITOR AND PAPER SUSTAINED

The United States Circuit Court of Appeals at Cincinnati, Ohio, handed down a decision on Dec. 15 sustaining the decision of Federal Judge John M. Killits of the Northern Ohio district against the Toledo Newspaper Company, publishers of the Toledo *News-Bee*, and against N. D. Cochran, editor of the paper, on the charge of contempt of court. The newspaper and its editor were charged with having written and published articles and editorials calculated to interfere with the court's rulings in connection with a temporary injunction to prevent the enforcement of a 3-cent-fare ordinance passed by the City Council of Toledo and affecting the Toledo Railways & Light Company. The decision of the Court of Appeals states that the articles in question tended and were intended to provoke public resistance to an injunction, if one should be made, and one of the findings is to the effect that they constituted an attempt to intimidate or, at least, to influence the District Judge with reference to the decision in the matter pending before him. The court held that it is of no importance in such a case that the effect that may have been produced in the Judge's mind was irritation instead of fear, as had been claimed in the hearings. Judge Killits assessed a fine of $7,500 on the newspaper company and $200 on Mr. Cochran. The case will be appealed to the United States Supreme Court.

Cleveland Car Type Unsettled.—Fielder Sanders, of Cleveland, Ohio, street railway commissioner, made an effort to have the City Council on Dec. 18, approve an all-steel trail car as the permanent type to be used. Council is undecided as between this car and the semi-steel car with center entrance which is now used. The Cleveland Railway favors the present type of car and the street railway committee had recommended its adoption as a permanent model.

Accident in Boston Elevated Power Plant.—A piston rod on a vertical cross-compound Westinghouse engine in the Lincoln power station of the Boston Elevated Railway broke on Dec. 19. As a result service had to be shut down temporarily on the Atlantic Avenue elevated line. An employee at the station was injured from escaping steam. The breakage of the piston rod was followed by the blowing out of a cylinder head, which fell upon a steam main carrying 180 lb. pressure. Services by additional equipment was restored in about ten minutes at the third rail.

Recommended That Station Be Scrapped.—The board of arbitration, to which the dispute between the Cleveland (Ohio) Railway and the city of Cleveland over a proposed power contract was submitted, announced on Dec. 12 that the Cedar Avenue power station should be scrapped and that a new substation should be built. The points yet to be decided are how the value of the power station shall be charged off and from what source the company shall receive its power supply. The company desires to close a contract with the Cleveland Electric Illuminating Company, while the city insists that the municipal light plant furnish the power necessary to take the place of the old station.

Increase in Wages in St. Louis.—The United Railways, St. Louis, Mo., has announced a 5 per cent wage increase, effective on Jan. 1. It is estimated the increase will cost the company $150,000 a year and will give each motorman and conductor about $50 a year more. The old scale was 23 cents an hour for first-year men and 1 cent more an hour for each additional year's service until six years, after which the scale stood stationary at 28 cents. Under the new scale first-year men will receive 24 cents an hour. One cent an hour increase will be paid in each year after the first until the seventh year, when 29½ cents will be paid. Thirty cents an hour will be paid the eighth year, 30½ cents an hour in the ninth year and 31 cents an hour in the tenth year and thereafter. Since 1904 the company has increased the wages of its trainmen 37 per cent.

PROGRAM OF ASSOCIATION MEETING

Central Electric Railway Association

The annual meeting of the Central Electric Railway Association has been changed by letter vote of the executive committee from Feb. 22 and 23, 1917, to March 8 and 9, 1917, at Indianapolis, Ind.

Financial and Corporate

ANNUAL REPORT

Chicago Elevated Railways Collateral Trust

The combined statement of income, profit and loss of the Metropolitan West Side Elevated Railway, the South Side Elevated Railroad and the Northwestern Elevated Railroad, which are controlled by the Chicago (Ill.) Elevated Railways Collateral Trust, is as follows for the years ended June 30, 1915 and 1916:

	1916		1915	
	Amount	Per Cent	Amount	Per Cent
Gross operating revenue	$8,435,008	100.0	$8,045,264	100.0
Operating expenses:				
Way and structures	$184,837	2.2	$163,679	2.0
Equipment	459,679	5.4	334 927	4.2
Power	991,533	11.8	911,093	11.3
Conducting transportation	2,270,081	27.0	2,042,388	25.4
Traffic	20,610	0.2	6,479	0.1
General and miscellaneous	408,321	4.8	411,737	5.1
Total operating expenses	$4,335,061	51.4	$3,870,306	48.1
Net operating revenue	$4,099,947	48.6	$4,174,958	51.9
Taxes, city compensation and other items	722,115	8.6	700,243	8.7
Operating income	$3,377,831	40.0	$3,474,715	43.2
Non-operating income	*135,694	1.6	*117,905	1.4
Gross income	$3,513,525	41.6	$3,592,620	44.6
Deductions—interest and rents	*2,247,407	26.7	*2,188,409	27.2
Net income	$1,266,118	14.9	$1,404,211	17.4
Dividends	1,135,543	13.4	1,105,373	13.7
Surplus	$130,576	1.5	$298,837	3.7

*Intercompany rentals deducted.

The combined gross operating revenues of the three controlled companies increased $389,744 or 4.8 per cent. The operating expenses, however, increased $464,755 or 12 per cent, so that the combined net operating revenue for the last year showed a falling off of $75,011 or 1.8 per cent. All the operating expense divisions except general and miscellaneous showed increases, the largest being $124,752 or 37 per cent in maintenance of equipment and $227,693 or 11.1 per cent in conducting transportation. Taxes and income deductions also increased, with the result that the net income for the year suffered a loss of $138,093 or 9.1 per cent as compared to the preceding period. The net income secured in the last year was equal to about 305 per cent on the $36,292,500 of pledged capital stock of the controlled companies.

The report of the Chicago Elevated Railways Collateral Trust, which is for the calendar year 1915, states that the combined net earnings of the three controlled companies for 1915 showed a decrease of $252,344 as compared to the previous year. For the first ten months of 1916, however, the combined gross earnings of those companies increased from 9 to 10 per cent as compared with the corresponding period of 1915, and it is expected that the net earnings for 1916 will show an increase of from 8 to 9 per cent over 1915.

In 1915 the collateral trust received dividends on stocks owned amounting to $1,027,045 and interest amounting to $125,585, making a total income of $1,152,630. Interest charges were $1,120,000 and general expenses $26,212, making total disbursements $1,146,212. The net income, therefore, was $6,417, which practically meant nothing available for dividends on the preferred certificates of the trust. In the year preceding the net income was $484,698, permitting dividend disbursements of $480,000.

During the year the trustees acquired the following securities classed as current assets: $73,000 of joint 5 per cent equipment trust certificates, series B, issued by the Metropolitan, Northwestern and South Side companies, dated Aug. 1, 1914; $254,000 of receiver's certificates, issued by the receiver of the Chicago & Oak Park Elevated Railroad; $16,000 of 6 per cent equipment notes of the Chicago & Oak Park Elevated Railroad and $5,362 of 5 per cent mortgage note secured by mortgage on property of the Chicago & Oak Park Elevated Railroad.

CAPITAL TRACTION COST ADJUSTED

Company and Commission Compromise on $10,996,214 as Main Reproduction Cost—Some Items Excepted

A formal agreement to adjust the differences in the reports of their two sets of engineering experts on the reproduction costs, which varied less than 5 per cent, has been reached by the Capital Traction Company, Washington, D. C., and the Public Utilities Commission of the District of Columbia. The established cost of reproduction is only one element of fair value, but it affords a working basis for further valuation determinations.

The agreement provides that the Capital Traction Company will accept the adjusted figures, *i.e.*, $10,996,214, as representing the total reproduction cost of that part of its physical property which is included in the commission report of Charles L. Pillsbury, as estimated under conditions named in said report, excepting land, interest, taxes and insurance on land, and working capital. The amount mentioned represents the estimated cost of the reproduction of the physical property referred to as of June 30, 1914, the Capital Traction Company reserving the right later to introduce evidence showing changes in such cost since that date.

The figure of $10,996,214 was arrived at by an increase of $754,039 in the figures in the revised report of Mr. Pillsbury, dated Nov. 22, 1916. This amount was derived by making the following adjustments:

1. By the acceptance on the part of the commission of the estimate for materials, tools and supplies on hand included in the J. G. White Engineering Corporation report for the company.

2. By the acceptance by the commission of the differences in base figures, this concession of the total net difference in base being made after a comparison of the detail figures between Mr. Pillsbury's report and the report of the J. G. White Engineering Corporation, made jointly by Mr. Pillsbury and the company's engineer, in furtherance of the adjustment next mentioned. This difference, amounting in all to $386,740, is an increase of 4.97 per cent over Mr. Pillsbury's figures.

3. By mean adjustment between the methods of applying localized costs and general costs resulting in an additional increase in Mr. Pillsbury's figures of $274,646, accompanied by a reduction, amounting to $274,646, in the localized and general costs as shown in the J. G. White Engineering Corporation report.

The agreement, however, makes a specific reservation that the adjustments above stated do not carry with them the acceptance on the part of the Captial Traction Company of the land values as submitted in Mr. Pillsbury's report. Nor do they in any wise affect the right and privilege of the Capital Traction Company to put in evidence items of physical cost which may or may not have been referred to in Mr. Pillsbury's report, but which items are not included in the total estimated cost of reproduction as reported by him.

The land values, etc., in Mr. Pillsbury's report to which exception is made amount to a total of $783,934. These include land, $618,116; insurance on land, $1,236; taxes on land, $12,362; interest on above items, $44,220, and working capital, $108,000.

Arkansas Valley Railway, Light & Power Company, Pueblo, Col.—The Arkansas Valley Railway, Light & Power Company is negotiating the purchase of the business and system of the Ordway Electric Light & Power Company, which serves the communities of Ordway and Sugar City, Col., electrically.

Ashland Light, Power & Street Railway Company, Ashland, Wis.—P. W. Brooks & Company, New York, N. Y., are offering an additional amount of first mortgage 5 per cent gold bonds of the Ashland Light, Power & Street Railway Company, making the total outstanding amount of such bonds $761,000.

Carolina Power & Light Company, Raleigh, N. C.—An initial dividend of one-half of 1 per cent has been declared on the common stock of the Carolina Power & Light Company, this being payable on Feb. 1 to stockholders of record on Jan. 16.

Interstate Railways, Camden, N. J.—John A. Rigg, president of the Interstate Railways, has issued a statement, saying in part: "There was mailed recently by the Real Estate Title Insurance & Trust Company, Philadelphia, trustee, to the holders of United Railways 4 per cent gold trust certificates and Interstate Railways 4 per cent collateral trust gold bonds a circular letter notifying such holders of a proceeding in equity to have the tripartite agreement of Dec. 20, 1902, declared terminated and ended and of the right of such holders to intervene in the equity suit and defend the same, inclosed being copies of the bill in equity and of the answers of the Interstate Railways and the Real Estate Title Insurance & Trust Company, of Philadelphia. The holders of United Railways 4s and Interstate 4s, we are assured by United Power & Transportation Company, need have no apprehension concerning their securities, for the purpose of the proceeding is not to impair their value in the least, but really to prevent a recurrence of the difficulties through which Interstate Railways passed from 1907 to 1910."

Iowa Southern Utilities Company, Centerville, Iowa.—The bond department of the Chicago Savings Bank & Trust Company, Chicago, Ill., is offering for subscription at 101 and interest, yielding more than 5.90 per cent, $550,000 of first mortgage sinking fund 6 per cent bonds of the Iowa Southern Company. The bonds are dated Oct. 2, 1916, and are due Oct. 1, 1933, but are callable on any interest date at 105 and interest. They are part of a total authorized issue of $2,500,000 and are followed in order by $200,000 of 6 per cent serial debenture mortgage bonds, $300,000 of 7 per cent preferred stock and $500,000 of common stock, all outstanding. The Iowa Southern Utilities Company was organized under the laws of the State of Maine in 1905, under the name of Centerville Light & Traction Company, and owns and operates the public utility properties serving Centerville, and a street railway serving the city and extending to the town of Mystic. The company has just acquired all the property of the Centerville, Albia & Southern Railway, which operated a passenger and freight electric railroad between Centerville and Albia. D. C. Bradley, the president of the company, in his statement to the bankers, outlines as follows the purposes of the financing: "Up to the present, the above properties have been financed by the owners from their own resources and from earnings. The rapid growth of the business, however, and the desirability of providing for acquisitions of a number of neighboring public utility properties have made it advisable to finance the corporation along customary lines. The present financing will provide for the retirement of existing floating indebtedness and will furnish the company with ample working capital."

Lake Erie, Bowling Green & Napoleon Railway, Bowling Green, Ohio.—As stated in the ELECTRIC RAILWAY JOURNAL for Aug. 26, page 375, the Lake Erie, Bowling Green & Napoleon Railway was sold on Aug. 5. The report subsequently became current that the road was entirely dismantled. This is not the case. That part of the road between Tontogany and Bowling Green, and between Pemberville and Woodville is entirely dismantled. The balance of the road namely, between Bowling Green and Pemberville, 11½ miles, was taken over by the Toledo, Fostoria & Fremont Railway and will be operated by that company.

Montreal (Que.) Tramways.—Coffin & Burr, Boston, Mass., are offering jointly with N. W. Harris & Company, New York, N. Y., $2,000,000 of first and refunding mortgage gold bonds of the Montreal Tramways dated July 1, 1911, and due July 1, 1941. The bonds are in the denomination of $500 and $1,000 each registerable as to principal. Interest is payable on Jan. 1 and July 1 in New York, Chicago or Montreal, or in London at the fixed rate of $4.86⅔. The Harris Trust & Savings Bank, Chicago, Ill., is trustee of the issue, with the National Trust Company, Ltd., Montreal, as co-trustee. Previous issues of the bonds are listed on the New York, Montreal and London Stock Exchanges and application will be made to list the present offering. The price at which the bonds are being offered is not given in the circular describing the issue.

New York State Railways, New York, N. Y.—A dividend of 1 per cent has been declared on the $19,952,400 of common stock of the New York State Railways, payable on Jan.

2 to holders of record of Dec. 22. In October last 1¼ per cent was paid on the common stock of the company. The regular quarterly 1¼ per cent on the preferred stock was also declared payable on Jan. 2.

Northern States Power Company, Chicago, Ill.—The directors of the Northern States Power Company have declared the usual quarterly dividend of 1¾ per cent on the preferred stock of the company, and have declared a dividend of 1¾ per cent on the common stock, which is an increase of one-quarter of 1 per cent. The preferred stock dividend is payable on Jan. 15, and the common stock dividend is payable Jan. 20, to stockholders of record Dec. 30.

DIVIDENDS DECLARED

American Cities Company, New York, N. Y., 1½ per cent, preferred.

Asheville Power & Light Company, Asheville, N. C., quarterly, 1¾ per cent, preferred.

Bangor Railway & Electric Company, Bangor, Me., quarterly, 1¾ per cent, preferred.

Carolina Power & Light Company, Raleigh, N. C., quarterly, 1¾ per cent, preferred; one-half of 1 per cent, common.

Columbus Railway, Power & Light Company, Columbus, Ohio, quarterly, 1½ per cent, preferred A.

Duluth-Superior Traction Company, Duluth, Minn., quarterly, 1 per cent, preferred.

Eastern Texas Electric Company, Beaumont, Tex., 3 per cent, preferred; 2½ per cent, common.

Elmira Water, Light & Railroad Company, Elmira, N. Y., quarterly, 1¾ per cent, first preferred; quarterly, 1¼ per cent, second preferred.

Illinois Traction Company, Peoria, Ill., quarterly, 1½ per cent, preferred.

New Orleans Railway & Light Company, New Orleans, La., quarterly, 1¼ per cent, preferred; one-fourth of 1 per cent, common.

New York State Railways, New York, N. Y., quarterly, 1¼ per cent, preferred; quarterly, 1 per cent, common.

Reading (Pa.) Traction Company, 75 cents.

Union Passenger Railway, Philadelphia, Pa., $4.75.

Utah Power & Light Company, Salt Lake City, Utah, quarterly, 1¾ per cent, preferred.

Virginia Railway & Power Company, Richmond, Va., 3 per cent, preferred.

Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md., quarterly, 75 cents, preferred.

Wisconsin Edison Company, Inc., New York, N. Y., $1.75; 75 cents extra.

ELECTRIC RAILWAY MONTHLY EARNINGS

CITIES SERVICE COMPANY, NEW YORK, N. Y.

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Nov., '16	$1.328,388	$20.021	$1,308,367	$244	$1,308,123
1 " " '15	490,622	15,537	475,085	40,833	434,252
12 " " '16	9,071,718	236,868	8,834,850	299,479	8,535,370
12 " " '15	4,352,412	167,112	4,185,300	490,000	3,695.300

PHILADELPHIA (PA.) RAPID TRANSIT COMPANY

1m. Nov., '16	$2,361,936	$1,321,399	$1,040,537	$814,174	$226,363
1 " " '15	2,136,746	1,192,258	944,488	815,532	128,956
5 " " '16	11,369,858	6,307,726	5,062,132	4,073,313	988,819
5 " " '15	10,203,500	5,722,268	4,481,232	4,080,296	400,936

PHILADELPHIA & WESTERN RAILWAY, UPPER DARBY, PA.

1m., Nov., '16	$43,452	$20,840	$22,612	$12,545	$10,067
1 " " '15	40,460	19,065	21,395	12,490	8,905
12 " " '16	511,227	244,122	267,105	150,555	116,550
12 " " '15	456,354	219,905	236,449	147,426	89,023

PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.

1m., Nov., '16	$479,367	$199,073	$280,294	$225,605	$54,689
1 " " '15	455,165	208,850	246,315	224,196	22,119
12 " " '16	5,453,454	2,521,251	2,932,203	2,692,578	2,239,625
12 " " '15	5,542,899	2,534,331	3,008,568	2,748,004	260,564

REPUBLIC RAILWAY & LIGHT COMPANY, YOUNGSTOWN, OHIO

1m., Nov., '16	$344,942	*$196,083	$148,859	$72,643	‡$76,465
1 " " '15	289,151	*167,266	121,884	57,200	‡65,184
11 " " '16	3,614,204	*2,092,146	1,522,058	773,321	‡754,567
11 " " '15	2,800,427	*1,706,191	1,094,235	618,169	‡477,856

*Includes taxes. ‡Includes other income.

Traffic and Transportation

BROOKLYN CAR AND SERVICE ORDER

B. R. T. Directed to Purchase 250 Cars in an Order by the Public Service Commission Censuring the Company for Over-Crowding.

The Brooklyn (N. Y.) Rapid Transit Company has been directed to purchase at once 250 additional cars for operation over its lines. The order was issued by the Public Service Commission for the First District, following the adoption of an opinion by Commissioner Travis H. Whitney, in which Commissioner Whitney censured the line for overcrowding its cars and for insufficient equipment. All of the new cars are directed to be in service by Feb. 1, 1918. It is ordered that the new cars shall be of the center entrance stepless type so-called, having a seating capacity of fifty-eight passengers each. Cars of similar type are now in use on the lines of the Brooklyn system.

In his opinion Commissioner Whitney found that it is impossible to regulate street car service in New York City by means of so-called health ordinances. He states that while such ordinances provide additional accommodations for a few passengers, the rest are denied accommodations, altogether, and the ordinance is thus regulating the public and not the street railroads. He finds other objections to such regulations. Commissioner Whitney finds that the present practice of the company of maintaining a balance of only 4.8 per cent reserve of cars for repairs and other exigencies must cease, as he holds that at least 8 per cent reserve is necessary. He states that any street railway in discharging its functions must provide not only sufficient cars for immediate needs, but must make ample provision for the near future. He criticizes the practice of the company in utilizing many cars seating only from twenty-four to thirty-eight passengers each, whereas he states if the company operated larger cars, it would be able to get more passengers past a given point in the rush-hour period, thus increasing accommodations materially. The opinion also disagreed with the contention of the company that it is a reasonable standard of service to operate surface cars during rush-hour period with a standing load of from 60 to 100 per cent.

Among the charges made by Commissioner Whitney are:

1. That overloading and inadequate service are largely due to insufficiency in equipment.
2. That the company is not doing its duty if it is not prepared to keep up with the development or growth of the community.
3. That the company contemplates opening four new surface lines without being prepared to meet the service needs.
4. That ninety of the present cars having a seating capacity of twenty-four to twenty-six passengers each have become obsolete and are unsuited for a community with a population of 1,800,000. The cars should be retired.
5. That the principal lines during rush hours show excessive overloading, in some cases of more than 100 per cent during an interval of an hour.
6. That the company, when it argues it is not getting a proper return, is attempting to reverse the existing law, which is that a fair return is predicated upon adequate service.
7. That the percentage of standees claimed by the company is not proper.
8. That heating and ventilation are inadequate.
9. That the company admits the inadequacy of the service and the superintendent of transportation asked for 100 additional cars, which he did not expect before 1917 or 1918.
10. That the company "no doubt still contemplates the continued maintenance of the percentage of overload" which it has adopted as a standard for operation.

With respect to the increase in traffic in Brooklyn Commissioner Whitney said:

"The increase in traffic on the Brooklyn surface lines from 1900 to 1915 inclusive, is shown by the following table:

Year	Brooklyn Surface
1900	204,106,397
1901	209,119,668
1902	216,594,408
1903	223,433,771
1904	233,184,407
1905	242,780,611
1906	265,204,811
1907	262,460,253
1908	274,766,791
1909	275,038,827
1910	289,308,085
1911	305,977,350
1912	322,321,981
1913	345,321,401
1914	351,905,234
1915	354,700,113

"The number of closed cars controlled by the Brooklyn Transit System including the Coney Island & Brooklyn Railroad, during the period from 1908 to 1915, inclusive, has been as follows:

Year	No. of Closed Cars
1908	1,823
1909	1,823
1910	1,841
1911	1,841
1912	1,841
1913	1,943
1914	1,943
1915	1,943

"It appears, therefore, that the percentage of increase in traffic has been far greater than the percentage of increase in cars necessary to transport the traffic, and, unless the facilities afforded for the traffic transported during the year 1908 were in excess of the requirements, the additions made to the accommodations have not kept pace with the requirements of increased traffic. It is an historical fact that the accommodations on the surface railroad lines in Brooklyn, during the year 1908, were not in excess of the needs of the time, as the service on the surface as well as on other lines in Brooklyn was, during that period, the subject of repeated complaint and criticism.

"It does not, however, follow that the number of cars should increase in exact proportion to the increase in the number of riding passengers. More frequent operation of cars might accommodate in part the traffic increase. Limiting points of operation where the maximum operation has been reached may prevent an increase in the number of cars, although the situation may be remediable through the substitution of cars of greater capacity.

"According to the testimony in this case, the companies now operate during the rush hour period 95.2 per cent of their total number of cars, leaving a balance of 4.8 per cent only for repairs and reserve. This reserve the commission considers insufficient and is considered by the companies as a very narrow margin. The incidents and exigencies of operation must be taken into account in rendering reasonable and adequate service. The commission is of the opinion that 8 per cent of the total number of cars used is a safe margin to be kept in reserve for repairs and emergencies. Upon the basis of 1,943 cars now operated, the companies should provide sixty-two additional cars of thirty-seven passenger capacity or thirty-nine cars of fifty-eight passenger capacity to allow such 8 per cent reserve. If the total number of cars to be operated be increased, the reserve would correspondingly increase. The commission finds that at least thirty additional cars of fifty-eight passenger capacity should be provided for the purposes of reserve."

Of special interest in this connection is the action of the Board of Health of New York on Dec. 16 in passing seven amendments to the sanitary code to take effect immediately with a view of enabling Health Commissioner Emerson to prosecute the railways for failure to relieve overcrowded conditions on the various lines. The action of Commissioner Emerson's predecessor, Dr. Goldwater in connection with the car-full order made by him before the recent reorganization of the personnel of the commission resulted in raising the question of jurisdiction as between the two sets of authorities and Dr. Emerson's plans as just announced have naturally called forth condemnation from Public Service Commissioner Whitney as noted in the present Brooklyn case. The amendments to the sanitary code will also give the commissioner the power to commence criminal proceedings for infractions of the law requiring cars to be properly heated, ventilated, and lighted.

ST. LOUIS DAMAGE EXPENSES AVERAGE 4.98 PER CENT OF GROSS RECEIPTS FOR SIX-YEAR PERIOD

The special report of the United Railways, St. Louis, Mo., for the first six months of 1916 abstracted in the ELECTRIC RAILWAY JOURNAL for Sept. 23, page 550, contained the following table showing the relation between the damage expenses of the company and the gross receipts since 1910:

Year	Damage Expenses	Percentage of Gross Receipts
1910	$468,325.82	4.05
1911	505,528.46	4.24
1912	607,237.88	4.96
1913	702,703.71	5.53
1914	740,606.43	5.95
1915	600,534.18	5.14

In commenting on these figures the report said:

"The tendency of people to regard personal injuries as an asset and demand large damages, the tendencies of juries and the courts to allow these claims, the activities of a certain class of the legal fraternity in specializing in these cases, the increasing congestion of city streets, and the increasing use of automobiles by inexpert drivers, all tend to increase the number and cost of accidents.

"A safety campaign energetically conducted for several years has checked, to some extent, the increasing size of the damage account. The officers of the company deplore the expenditure of this money, and are exerting every effort to minimize accidents and settle damage claims economically. The cost of damages in St. Louis compares favorably with similar expenditures by street railway companies in other American cities of a comparable size."

ABANDONMENT OF SERVICE DISALLOWED

The Supreme Court of Ohio rendered a decision on Dec. 12 to the effect that the Hocking Valley Railroad must maintain electric service over its line between Hamden and Jackson, although the company insisted that the line is not profitable. This decision upholds the order of the Public Utilities Commission issued on Sept. 1, 1914. Precedents have been established by other courts to the effect that, before a railroad can change the form of its service because of changed conditions in the community, it must have sufficient experience to establish its claim. This decision follows the rule set forth in precedents in declaring that the Hocking Valley Railroad did not have such experience, as it had not been operating a sufficient length of time after conditions changed. The section through which the line passes was at one time a busy coal mining and furnace region, but of late years many of the mines have been abandoned and the iron works closed. This reduced the patronage and left mainly farmers as patrons. Three years ago the company endeavored to abandon the service, but the people living along the line took the matter to the Public Utilities Commission. In the face of proof that the line had been operated at a loss for ten months, the commission ordered electric service restored.

INTERURBAN RAILWAY SAFETY CAMPAIGN

The Chicago, North Shore & Milwaukee Railroad, Highwood, Ill., has issued the following notice:

"The Chicago & Milwaukee Railroad has been recently reorganized as the Chicago, North Shore & Milwaukee Railroad, and it is the desire of the new management to cultivate the good will and secure the co-operation of all its patrons and neighbors in the various villages and cities by giving good service.

"Constant supervision is being given to the conditions affecting the safety of operation. Signals, protective devices and gates are being installed, obstructions to vision cleared, and an organized campaign of safety, under the direction of an experienced safety engineer, has been started among all employees, and we earnestly request that the public co-operate with the company in every way possible in this regard.

"The safety engineers will extend this campaign shortly to include instructive talks to all the school children in the various schools along the line, and to impress upon them the care to be exercised in crossing the tracks or in getting on and off the cars."

REARRANGEMENT FOR I. T. S. FREIGHT SERVICE

Option on all the necessary right-of-way for rearrangement of tracking conditions at various points on the Illinois Traction System, Peoria, Ill., has been secured, and work will begin in the spring of 1917 to carry this out in order to facilitate the movement of freight through certain towns. This work contemplates the straightening of curves at Mount Olive and Litchfield, and a belt line at Staunton which will make possible the handling of foreign freight cars in any quantity on the Litchfield-Hillsboro division of the system. At Staunton a branch off the main line will be built at the point where the main line crosses the Wabash Railway tracks to Mine No. 14. From this point the proposed belt line will extend east on private right-of-way for 0.75 mile, and then on Wabash right-of-way for an equal distance to a connection with the Staunton-Hillsboro division.

At present, at Litchfield, the Illinois Traction tracks cross the lines of the Wabash, Illinois Central and Chicago, Burlington & Quincy tracks at grade, making it necessary to flag all three of these crossings. Under the new arrangement the crossing with these railroads will be made at an interlocker some distance south of the present crossing, with new track laid on a private right-of-way from this point in a northeasterly direction and out State Street to the present passenger station. This new right-of-way will cross the Litchfield public reservoir by means of a fill 240 ft. long, with two outlets 48 in. in diameter. This public reservoir has a capacity of 90,000,000 gal., and permission has been secured from the city to make this crossing.

PRESIDENT BRUSH ASKS CO-OPERATION

Matthew C. Brush, president of the Boston (Mass.) Elevated Railway, has issued two statements to the public of Greater Boston asking for co-operation in making the car service as good as possible, especially in connection with the holiday traffic. The travel between residential and shopping districts is greater in Boston this year than ever before and the removal of surface cars from Washington Street has tended to increase still further the patronage of the rapid transit lines, especially in the Washington Street tunnel. The company is operating eight-car trains through this tunnel on the shortest headway consistent with safe service, but notwithstanding this, a certain amount of congestion occurs at the various stations during the evening rush hours. His statement points out that to the extent that shoppers consistently can leave the downtown district slightly ahead of the afternoon rush-hour traffic, the handling of the enormous crowds now requiring transportation will be materially facilitated.

The second statement bespeaks the co-operation of the traveling public in giving names as witnesses to employees when requested or by sending to the company statements of untoward occurrences on the cars that might otherwise not come to the attention of the management. The company is bending every effort toward the elimination from its cars of those persons who are under the influence of liquor or are otherwise disorderly. Extra efforts are being made to keep the stations and cars free from objectionable persons. The statement says in part:

"I earnestly urge the co-operation of the entire community served by our company, in the suppression of any disorderly or discourteous acts on any platform or cars under our jurisdiction and nothing will be more conducive to the elimination of objectionable persons than the cordial co-operation of all our other patrons."

Car Mail Boxes Opposed.—The Kansas City (Mo.) Railways has notified the post office at Kansas City that it will not consider any proposition, regardless of compensation offered, for attaching mail boxes to the cars of Kansas City. The announcement mentions unfavorable experience as to service to the public in cases where mail boxes have been used on cars.

Name-Suggesting Contest Closed.—The Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., has closed the contest for the selection of two names by which two new trains of the company are to be designated. From thousands of names suggested, the two chosen were the "Second City Limited" and the "Universal Limited." Each of the successful contestants received $5.

New Albany Tariff Suspended.—The Public Service Commission for the Second District of New York, by order of date Nov. 8, suspended from Nov. 25, 1916, until Jan. 25, 1917, unless otherwise ordered, the taking effect of the changes in the fare tariff on the Albany-Troy line of the United Traction Company referred to in the ELECTRIC RAILWAY JOURNAL of Nov. 11, page 1040, seeking the elimination of transfers on the Albany-Troy line.

Car Stop Signs on Poles.—Experiments are being made by the International Railway, Buffalo, N. Y., with a new stop sign on the Kenmore-Tonawanda division of its interurban line. The sign is an 18-in. white band painted on the poles along the line. The bands are 5 ft. above the ground and are easily seen. In some places the company has been displaying "Cars-Stop-Here" signs on the wire. If the experiment proves a success the system will be generally adopted on the interurban lines.

Children Carried Free to Safety Conference.—In order that all the children of Scott County, Ky., may be present at a safety first meeting to be held in connection with a fair at Georgetown, the county seat, on Dec. 22, the Kentucky Traction & Terminal Company, the Frankfort & Cincinnati Railroad and the Queen & Crescent Railroad, announced that they would carry them free from any part of the county. The safety first movement is being carried out by the Kentucky Traction & Terminal Company and will be extended over the whole system.

Journal Cartoon Reproduced in Youngstown.—The *Em-An-Ess Electric News*, published in the interest of the employees of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, reproduced in its issue for December the cartoon "Every Employee a Publicity Representative," which appeared in the ELECTRIC RAILWAY JOURNAL for Nov. 4. The Mahoning & Shenango Railway & Light Company, adapting the picture more nearly to its own requirements than the text permitted as it appeared in this paper, labeled the cartoon, "Why Courtesy?" and published some pointers to its own men on this topic underneath the picture.

Drops Handkerchief, Traffic Is Suspended. Courtesy Paramount.—One of the Eugene (Ore.) papers contained the following item in a recent issue: "Eugene street car men are the embodiment of courtesy. Of course everybody knew that, but now and then a concrete example comes to the attention of the public. Just this morning one of these watchful aids in the public service observed a young lady drop her handkerchief. Promptings of courtesy at once asserted themselves, and without a moment's hesitation he stopped his car in the middle of the block, and, hastening after the young lady, called her attention to her loss. When she had recovered the bit of linen, the car resumed its way up Willamette Street."

Men Complimented for Reduction in Claims.—The legal department of the Kansas City (Mo.) Railways sent a special message to the various departments in December, complimenting the men on the marked reduction in claims in November. A particularly gratifying reduction was in the number of cases where people had brought suit or filed claims concerning accidents of which the company had no record. Under the present safety practice and custom of the company, the trainmen are required to report every accident or incident which might by any stretch of the imagination become the basis of a claim. There has accordingly resulted a better fund of information to assist the legal department to meet improper claims.

Railway Employees Urge Jitney Regulation.—More than 500 office employees of the British Columbia Electric Railway, Ltd., Vancouver, B. C., have organized for the purpose of urging the City Council of Vancouver to pass regulations which will put the jitney under the same regulations as the street railway. Their representatives who called on the Mayor pointed out that the movement is not connected with the management of the company's interests, but is solely for their own protection. They stated that if the jitney drivers claim that further regulations will put them out of business, the same is also true as regards the employees of the railway, unless adequate jitney regulations are passed. Petitions are being drawn up and will be presented to the City Council.

Changes in Illinois Traction Fares.—After Dec. 29 the cars of the Illinois Traction System operated between St. Louis, Mo., and the Tri-Cities in Illinois will be run pay-as-you-leave instead of pay-as-you-enter. It has also been decided by the management that from Dec. 29 six tickets for the Tri-City-St. Louis trip will be sold for 50 cents. A special ticket, good between the hours of 5 a. m. and 8 a. m. and 5 p. m. and 8 p. m., entitling the holder to fifty-two rides, will be sold for $3. This will effect a saving of $2.20 over the regular rate, as the 10-cent fare recently allowed by the Interstate Commerce Commission applies to most points on the trip. It has also been announced that there will be one car every seven and one-half minutes, instead of one every ten minutes.

One-Man Cars in Leavenworth.—The Kansas City Western Railway, Kansas City, Kan., is rebuilding its Leavenworth city cars for one-man operation, closing the rear door and removing that step; installing sliding double doors on the front vestibule and placing fare receivers in this vestibule. The city objected that one-man operation was not safe for the passengers, but this objection was removed by agreement between the company and the city. The Kansas City Western Railway formerly operated ten cars in Leavenworth. Since the 3500 soldiers, expending $100,000 a month, have been away from Fort Leavenworth, business has not continued to increase as of old. The company will remodel and operate six local cars. The interurban service of the company has also suffered because of the absence of the soldiers, and schedules have been reduced.

Within the Law Interurban Lines Are Railroads.—An accident recently occurred on the interurban line operated by the San Francisco-Oakland Terminal Railways, and suit to recover damages was brought by parties injured in the automobile which collided with the street car. The suit hinged on the question of whether the electric line was a railroad or a branch of a street railway system. If the former, the chauffeur would be required to "Stop, Look and Listen," whereas in the case of a street car line he would be required only to look and listen. Superior Judge Waste ruled that within the meaning of the law an interurban electric railway was a "railroad," and that the same interpretation would apply as in the case of steam lines. The electric railway, therefore, won the case. The rule applies to every crossing of the interurban line, whether or not the crossing is within the city limits. In this particular case it was shown that the driver of the automobile was intoxicated at the time of the accident, and in his decision the Judge recommended that the district attorney enter suit against the man for reckless driving while under the influence of liquor.

Fort Worth Jitneys Excluded from Business District.—The City Commission of Forth Worth, Tex., has passed a jitney ordinance which is to become effective on Jan. 1. The new measure will prohibit jitneys from operating on Main and Houston Streets or any intersecting streets between Weatherford and Front Streets, except on Fifteenth and Second Streets. Jitney cars will not be allowed to stand on Fifteenth or Front Streets and will not be permitted to stop on these streets longer than is necessary to put off or take on passengers. No one will be allowed to drive a jitney except the driver named in the original application for a license or subsequently approved. No license may be transferred without approval by the city, and any violation of the ordinance may be regarded as grounds for revocation of license. Jitney men protested to the City Commission that the ordinance excluded them from the business district of the city and would compel them to stop running. Their objections were overruled. The jitney men then undertook to circulate petitions to order a referendum election on the ordinance, but Mayor Tyra and the City Commission took the position that the ordinance was a police regulation and was not subject to referendum vote of the people. The City Commission assigns safety to pedestrians and traffic in general as the reason for ordering the jitneys off Main and Houston Streets.

Personal Mention

R. B. Marchant, treasurer of J. G. White & Company, Inc., New York, N. Y., has been elected vice-president of the company.

Gilbert E. Porter has been elected to the governing committee of the Chicago (Ill.) Elevated Railways to succeed Henry A. Blair.

W. H. Zinsmeister, formerly assistant auditor of the Empire United Railways, Syracuse, N. Y., has been appointed auditor of the company to succeed S. C. Rogers, whose appointment to the American Pulp & Paper Company is noted elsewhere in this issue.

Homer Hodson, former secretary of the East St. Louis Commercial Club, has been appointed head of the safety-first department of the East St. Louis & Suburban Railway, East St. Louis, Ill., in charge of the safety-first advertising campaigns which the company is planning.

W. E. Rolston, electrical engineer of the Chicago, Lake Shore & South Bend Railway, Michigan City, Ind., has had his jurisdiction extended and now has control of the shops and equipment of the company, with the title of superintendent of power and equipment. Mr. Rolston has thus taken over the duties that formerly devolved on the late Karl L. Wilcox as master mechanic of the company.

Fred J. Warnock, who has been chief claim agent of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, for the last five years, has resigned, effective on Jan. 1, to practice law for himself. Mr. Warnock was born near New Castle. He moved to Youngstown with his parents when he was twelve years old. He began the study of law under Theodore Johnson, dean of the Y. M. C. A. law school at Youngstown, and in his studies was closely associated with R. J. Nicholson, retiring assistant prosecutor of Mahoning County, with whom he will now enter into partnership.

Joseph F. Collins, whose appointment as division superintendent of the Mahoning Valley division of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, was noted in the ELECTRIC RAILWAY JOURNAL for Dec. 9, has been with the company for more than fourteen years, joining its force on Aug. 4, 1902, when he became freight clerk and assistant to Richard Flannery, dispatcher at the West Federal carhouse. Mr. Collins was located there for four years, acting as extra dispatcher, assisting in the shop. Shortly after the Park & Falls and the Mahoning Valley lines were merged Mr. Collins became night inspector and finally was appointed chief inspector.

S. C. Rogers, assistant treasurer and auditor of the Empire United Railways, Syracuse, N. Y., has resigned to accept a position as comptroller of the North American Pulp & Paper Company at Montreal, Can. Mr. Rogers has been connected with the Empire United Railways since May, 1915. Before that he had been, since 1911, secretary and treasurer of the Youngstown (Ohio) Dry Goods Company, which position he assumed after ten years of service with the Mahoning & Shenango Railway & Light Company, Youngstown, and its constituents. Before entering the field of public service accounting and finances he served nineteen years in New York and Chicago with J. M. Young & Company, importers of china, glass and fancy goods.

Rex D. Billings has been appointed chief claim agent of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, to succeed Fred J. Warnock, whose resignation is noted elsewhere in this column. Mr. Billings was formerly Mr. Warnock's chief assistant at Youngstown, but for the last three years has been chief claim agent of the Reading Transit & Light Company, Reading, Pa. Mr. Billings was born on Aug. 8, 1888, and was reared in Warren, Ohio. He became connected with the Mahoning & Shenango Railway & Light Company as a claim adjuster eight years ago, and when Mr. Warnock was made head of the claim department Mr. Billings was promoted to the position of assistant chief of claims.

F. A. GANNON

Frank A. Gannon has been promoted to the office of assistant treasurer of the United Railways, St. Louis, Mo. Mr. Gannon entered street railway service in St. Louis twenty-five years ago with the Lindell Railway, when the motive power was Missouri mules. From office boy he was advanced to messenger. Fifteen years ago he was appointed cashier and since that time it is estimated that about $75,000,000 has passed through his hands. In addition to his official duties with the company, Mr. Gannon is assistant treasurer of the Employees Mutual Benefit Association, which now numbers 4019 members, and is president of the United Railways Dramatic Club, which has a membership of several hundred. He is also a director of the United Railways Savings & Loan Association, which has issued more than $2,500,000 of stock certificates to employees who are building their own homes. Mr. Gannon was born in Sullivan, Mo., in 1873, and went to St. Louis in 1874. He was educated at Christian Brothers College. He is married and has two sons and two daughters. Mr. Gannon is prominent in civic affairs and is treasurer of the improvement association in the Shaw District, in which section is his home.

Lafayette G. Rudd will continue in charge of the Lyme and Saybrook divisions of the Shore Line Electric Railway, Norwich, Conn. It had been proposed to extend Mr. Rudd's jurisdiction also to cover the New London lines of the company. An official statement says that because of the extent of the territory involved in the consolidation of the New London, Lyme and Saybrook divisions of the company, under a single superintendent, as was contemplated by the promotion of Mr. Rudd to the position, it has been decided by the officials of the corporation that such a change would not be expedient at this time. Mr. Rudd will, therefore, resume his former place as superintendent of the Lyme and Saybrook divisions, and for the present W. C. Callaghan, general manager, will have personal oversight of the New London lines.

E. E. Downs was recently elected president of the Alton & Jacksonville Railroad, Alton, Ill., formerly known as the Alton, Jacksonville & Peoria Railroad. Mr. Downs was formerly vice-president and general manager of the Sterling, Dixon & Eastern Railway and the Lee County Lighting Company, Dixon, Ill., from which he resigned to take the position of general manager for the receivers of the Chicago & Milwaukee Electric Railroad. He remained with the Chicago & Milwaukee Electric Railroad during the term of service of the receivers, when he became general manager of the Elgin & Belvidere Electric Company, owned by Bion J. Arnold. After serving the last-mentioned company three years, he resigned to organize a company and introduce the automatic parcel checking locker system. He takes charge of the Alton & Jacksonville Railroad as the property changes ownership, and expects to make many improvements to better the service and the condition of the physical property.

D. C. Green, for the last year and a half manager of the Salt Lake City division of the Utah Power & Light Company, has resigned that position to become general manager of the Fort Smith Light & Traction Company, Fort Smith, Ark. This property, which is operated by H. M. Byllesby & Company, Chicago, Ill., furnishes the electric lighting and street railway service in Fort Smith and operates an electric interurban railway between Fort Smith and Van Buren. Before taking his position with the Utah Power & Light Company Mr. Green had been connected with the Byllesby company for several years at San Diego, Cal.; Albany, Ore.; Marshfield, Ore., and Everett, Wash. Mr. Green is a graduate of Purdue University, Lafayette, Ind., class of 1908.

Raymond H. Smith, whose promotion from the position of general manager of the Jackson Light & Traction Company of Jackson, Miss., to that of vice-president and general manager of the Sheboygan (Wis.) Electric Company, was noted in the ELECTRIC RAILWAY JOURNAL of Nov. 11, was presented, before he left Jackson, by the citizens of that city with a silver loving cup, about 12 in. high, exclusive of base, "in grateful recognition of his public service." Mr. Smith took charge of the local street railway, electric plant and gas plant at Jackson four years ago, and his work brought him in contact with practically the entire population of the city. He rehabilitated the plant, installed one-man cars and reduced operating expenses. For the first three years of his service in Jackson Mr. Smith had to contend with competition in the electric light and power business. The competitor died a natural death, but the question of municipal ownership immediately came up. The people defeated the proposed plan, and Mr. Smith received much credit for his work during the agitation. In addition to his work in the railway and light field in Jackson Mr. Smith improved greatly the operation and service of the gas plant. Many of the citizens of Jackson signed a telegram of protest against Mr. Smith's removal to Sheboygan, but, finally decided that it would not be fair to attempt to deprive Mr. Smith of an excellent opportunity for promotion and did not send the message. Mr. Smith was active in the local Board of Trade at Jackson and at the time of his departure from that city was president of the local Rotary Club. An incident worthy of note is the fact that each member of the Jackson Rotary Club wrote a letter to a member of the Sheboygan Rotary Club in the same business, commending Mr. Smith in the very highest terms. In consequence, at the first meeting of the Sheboygan Club after his arrival Mr. Smith was unanimously elected to full membership without the formality of any investigation.

E. C. Hathaway, whose resignation as assistant general manager of the Virginia Railway & Power Company, Richmond, Va., in charge of the properties of the company at Norfolk, was noted in the ELECTRIC RAILWAY JOURNAL for Dec. 16, has been in charge of the companies there for fourteen years and was connected with them in an advisory capacity for two years prior to that. In 1902 he was appointed vice-president and general manager of the Norfolk, Portsmouth & Newport News Company, a consolidation of the railway and lighting companies in Norfolk, Portsmouth, Newport News and Hampton. After the withdrawal of the Newport News and Hampton companies and the reorganization under the name of the Norfolk & Portsmouth Traction Company, Mr. Hathaway held the same title, and in 1911, when that company was absorbed by the Virginia Railway & Power Company, Richmond, he was retained with the title of assistant general manager. Before coming to Norfolk, Mr. Hathaway was general manager of the Railways & Light Company of America, with headquarters in Baltimore. This company controlled the utility properties in Norfolk, Knoxville, Tenn., Lexington, Ky., and several other places. Mr. Hathaway is resigning at Norfolk because his many other interests require the greater part of his time and attention. His principal outside interest is the Railway Audit & Inspection Company, Philadelphia, of which he is president. This company was organized by Mr. Hathaway about ten years ago and has steadily grown until it has now become necessary for him to devote a good deal of his time to it. He will retain his residence in Norfolk, where he has numerous other interests. His successor at Norfolk will be T. Norman Jones, who is at present chief engineer of maintenance of way of the Virginia Railway & Power Company in Richmond.

E. C. HATHAWAY

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Waterbury & Bristol Tramway, Waterbury, Conn.**—A petition will be presented to the incoming General Assembly for the incorporation of the Waterbury & Bristol Tramway to construct a line between Bristol and Waterbury. Among those interested are Frederick N. Manross, Bristol; Richard Elliott, Southington, and John R. Hughes, Waterbury.

***Westfield River Railway, Huntington, Mass.**—The Selectmen of Huntington, Cummington, Chesterfield, and Worthington have petitioned the Legislature to pass a bill incorporating the Westfield River Railway to construct an electric railway along the Westfield River and Major Brook and manufacture for itself and the adjacent towns electric energy for light, heat, and motive power. Capital stock, $182,000. Leonard F. Hardy, Huntington, is interested.

Coatesville (Pa.) Trolley Company.—The Public Service Commission of Pennsylvania has approved the application for a charter for the Coatesville Trolley Company, which proposes to construct a line in Coatesville and in East Hallowfield and Valley Townships. The applicants for the charter are H. I. Schotter, J. V. Pennegar, C. F. Humpton, H. G. Rambo, and W. J. Elliott, all of Coatesville. [Sept. 23, '16.]

***Mineral Heights Street Railway, Greenville, Tex.**—Incorporated with a capital stock of $3,000. Incorporators: J. A. Phillips, J. M. Massey, and W. T. Wright, Greenville.

FRANCHISES

***Globe, Ariz.**—The City Council of Globe has granted the request of C. H. Munson for an option for three months on the local street railway franchise at $1,500.

Bridgeport, Conn.—The Connecticut Company will petition the Legislature in January for permission to extend its tracks on Golden Hill Street, northerly through either Middle or Water Streets or Housatonic Avenue to Congress Street, in an effort to relieve the congestion of traffic on Main Street. The company will also petition for permission to extend its Oak Street line through Madison Avenue to Marion Street.

Bristol, Conn.—The Bristol & Plainville Tramway Company will petition the next General Assembly for an amendment to its charter under which the company will be allowed to extend its lines on lower Main Street, South Street, Wolcott Street, and West Street.

Hartford, Conn.—The Connecticut Company will ask the Legislature for permission to extend its East Street line from the present terminus on Smalley Street as far as the railroad crossing, and also to extend the Pleasant Street line from the terminus at Fairview and Pleasant Streets into Fairview Street and thence southerly to Kelsey Street, down Kelsey Hill to Rocky Hill Avenue.

Caldwell, Idaho.—The Caldwell Traction Company has received a franchise from the City Council of Caldwell to construct a line along Cleveland Boulevard and other streets.

Urbana, Ill.—The Kankakee & Urbana Traction Company has received a franchise from the City Council of Urbana giving permission to lay special work so as to make physical connection with the Wabash Railway, the plan being to handle grain shipments from the traction company to the steam railroad.

Columbus, Kan.—The Oklahoma & Northern Traction Company will ask the City Council for a franchise to construct a line in Columbus. W. K. Palmer & Company, Kansas City, Mo., consulting engineers. [Nov. 4, '16.]

Gardner, Mass.—The Northern Massachusetts Street Railway has asked the Council for a franchise to construct an extension on Parker Street, Gardner.

Cleveland, Ohio—The Cleveland Railway has received a franchise from the City Council to construct an extension on Hough Avenue to East 105th Street.

Columbus, Ohio—The public utilities committee of the City Council recently approved a franchise giving the Columbus Depot Company the right to construct and operate tracks and switches across Town, Front, Rich, Walnut, and Wall Streets, near High Street, and to build a depot over Wall Street. The time for the completion of the depot has been extended to 1919. It was to have been completed by January, 1917.

Dallas, Tex.—The Dallas Northwestern Traction Company and the Dallas Southwestern Traction Company have been granted a six months' extension of time on their franchises in which to begin construction on their proposed lines to Cleburne and Denton. E. P. Turner, Dallas, president. [Oct. 21, '16.]

***Princeton, W. Va.**—A. S. Hecker, Pittsburgh, Pa., and H. E. De Jarnette, Princeton, W. Va., have asked the Council for a franchise to construct a line to be operated by either steam, electricity, or horse power, from Princeton to Athens, about 6 miles.

TRACK AND ROADWAY

***Fort Smith, Ark.**—Albert Emanuel, president of the Albert Emanuel Company, Schwind Building, Dayton, Ohio, is reported interested in a plan to construct an electric railway between Fort Smith and surrounding towns within a radius of 50 miles. Options on electric power plants in Booneville, Mansfield, Huntington, Hartford, and Greenwood have been obtained.

Visalia Electric Railroad, Exeter, Cal.—It is reported that this company may construct an extension from Lindsay to Woodville, 11 miles.

Pacific Electric Railway, Los Angeles, Cal.—This company on Dec. 3 began the use of its new elevated line, constructed at a cost of about $300,000. This new terminal improvement, built to relieve congestion on Main Street, permits the rerouting of a large number of cars to San Pedro Street. The elevated line leads from the rear of the Main Street Station at the second-story level, which is the street level at the front, to San Pedro Street, approximately 2000 ft., and carries practically all outgoing trains and a few incoming. The majority of incoming trains enter the station from Main Street, as before. The new structure is of steel and concrete construction, and carries three tracks completely equipped with automatic signal system. Loading and unloading platforms, supporting reinforced concrete and steel umbrella sheds, parallel the line on either side for a distance of about 1100 ft. Work on the structure was begun in April, upon an order issued in 1915 by the City Board of Public Utilities demanding relief of traffic congestion on Main Street.

Lordship Company, Bridgeport, Conn.—A petition will be presented to the General Assembly when it convenes to have an extension built by the Lordship Company in Bridgeport.

Washington & Maryland Railway, Washington, D. C.—This company reports that during 1917 it will construct a 1-mile extension from its present terminus to Sligo Creek in Tacoma Park, Md.

Jacksonville (Fla.) Traction Company.—Double tracks across Springfield Park from Pearl Street to Cedar Street and on Cedar to Eagle and down Eagle to Hogan Street are being laid by the Jacksonville Traction Company, to eventually be completed with double track on Hogan Street to Bay Street.

Georgia Railway & Power Company, Atlanta, Ga.—A contract has been awarded to R. M. Walker, Atlanta, at $19,400, to repair the Edgewood Avenue bridge, the cost to be divided between the city, the Southern Railway, and the Georgia Railway & Power Company.

Aurora, Mendota & Western Railroad, Aurora, Ill.—It is reported that this company will construct its proposed line from Aurora to Mendota by day labor. H. D. Hallett, 132 Downer Place, Aurora, engineer. [Sept. 16, '16.]

Fox & Illinois Union Railway, Aurora, Ill.—This company proposes the construction of an extension from Morris south to Gardner and thence to Dwight.

Chicago & West Towns Railway, Chicago, Ill.—This company has discontinued service through the village of Berwyn owing to franchise difficulties with the Village Council.

Woodstock & Sycamore Traction Company, Genoa, Ill.—This company, which operates between Sycamore, Genoa and Marengo, twenty-five miles, will electrify its line during the coming spring. Cars are now being operated by gasoline.

Illinois Traction System, Peoria, Ill.—The town of Catlin has approved the plan of the Illinois Traction System for taking care of its track through the village streets. As Catlin is under a commission form of government, the settlement of the franchise privileges was voted on by the citizens who approved the franchise granting the following type of construction: The track is to be rebuilt in the center of the street, occupying a space 7 ft. wide; the ties are to be surfaced on 6 in. of washed gravel and the track then filled with stone screenings up level with the brick paving each side of the track. This settlement came after some agitation to force the company to pave the streets of the village over which its lines pass, in order to gain franchise rights.

Quincy (Ill.) Railway.—This company has purchased a lot, 140 x 160 ft., at the southwest corner of Ninth and Locust Streets, Quincy, in contemplation of another loop. The construction of the new loop will enable cars to make a shorter circuit and to avoid entering the grounds of the State Soldiers' home at certain periods of the day.

Indiana Railways & Light Company, Kokomo, Ind.—This company is reported to have in contemplation two extensions in Kokomo, one to the northwestern part of the city and the other to the southern part of the city.

Orleans-Kenner Electric Railway, New Orleans, La.—It is reported that this company contemplates the construction of a 6-mile extension from St. Charles Parish. Johnson & Company, Inc., New Orleans, contractor.

***Portland, Me.**—Plans are under contemplation for the construction of an electric railway to connect Portland and York Beach, Me., with Portsmouth, N. H. The York Beach Chamber of Commerce is interested.

Massachusetts Northeastern Street Railway, Haverhill, Mass.—The Public Service Commission of Massachusetts has issued an order authorizing the Massachusetts Northeastern Street Railway to issue $100,000 of first mortgage, twenty-year, 5 per cent. bonds. Of the proceeds, $36,000 are to be used for construction and for railway equipment and $64,000 for carhouse equipment.

Michigan Railway, Kalamazoo, Mich.—This company is negotiating for the sale of its tracks inside the city limits of Flint, extending from the northern limits to Hamilton Avenue, to the Detroit United Railway.

St. Paul Southern Electric Railway, St. Paul, Minn.—This company is constructing an extension from Hastings to White Rock, 23 miles. Two 160-ft. and six 80-ft. steel spans will be erected on piles. On the completion of this extension the company contemplates the construction of a line through White Rock, Dumbrota, Rochester, Chatfield, Preston, and Harmony, Minn., and Burr Oak, Iowa, to Decorah, a distance of 126 miles.

***Kansas City, Mo.**—It is reported that Samuel J. McWilliams, secretary of the Gaston Railway Syndicate, Scarritt Building, Kansas City, Mo., is interested in the construction of a proposed line from Kansas City to Springfield, via Butler and Rockville.

International Railway, Buffalo, N. Y.—Surveys have been made and work will be begun in the spring by the International Railway on the construction of an extension of its Elmwood Avenue line from Hertel Avenue to the city line.

***New York, N. Y.**—A statement has been issued by F. Van Z. Lane, traffic engineer, Bayonne, N. J., urging the construction of an electric railway from Staten Island to New York via Bayonne, Greenville, and Lower Jersey City. It is proposed to construct a tunnel under the Kill von Kull River between Staten Island and New Jersey.

Ohio Electric Railway, Springfield, Ohio.—Bids will soon be asked by the Ohio Electric Railway for constructing a 120-ft. steel deck girder bridge, with concrete abutments, over the Cincinnati, Hamilton & Dayton Railroad at Middletown.

Welland, Ont.—Municipalities along the Canadian shore of Lake Erie between Port Colburne and Bridgeburg and the municipalities between Port Colborne and Welland along the east side of the Welland Canal, will vote on Jan. 1, or at special elections to be held soon after, on propositions guaranteeing bonds for a publicly owned hydroelectric radial railway. The cost of the proposed railway is estimated at $2,208,716. It will be built by the Ontario Hydro-Electric Commission.

Montgomery Transit Company, Philadelphia, Pa.—A report from the Montgomery Transit Company states that the company has under construction an extension from Harleysville to Souderton, 4.3 miles, and from Lederach to East Greenville, 12 miles.

Dallas (Tex.) Electric Company.—Street railways of Dallas are unable to comply with the orders of the City Commission to lay 90-lb. T rails on Tremont and Colorado Streets, the time limit for this work having expired Dec. 1. According to Edward T. Moore, general manager of the lines, the company has found it impossible to procure the rails necessary for laying this work, and the City Commission has voted not to enforce the penalty provided by the charter for failure to comply with its order on the part of the company.

Roanoke Railway & Electric Company, Roanoke, Va.—Work will be begun at once by this company on the construction of 4,000 ft. of new single track on Ninth Street for the Viscose silk mills.

Monongahela Valley Traction Company, Fairmont, W. Va.—During 1917 the Monongahela Valley Traction Company expects to construct 17 miles of new track.

SHOPS AND BUILDINGS

Chicago, North Shore & Milwaukee Railroad, Highwood, Ill.—As one of the movements in preparation for the establishing of freight service on the Chicago, North Shore & Milwaukee Railroad, work has been begun in the placing of a yard for storage of the freight cars and equipment near the south limits of North Chicago. Tracks are being placed, the overhead system is being rapidly installed, and all arrangements are being made for the establishment of both a switch yard and a storage yard for the care of the freight department.

Toledo Railways & Light Company, Toledo, Ohio.—This company contemplates the construction of a carhouse on the site of the old Casino. The new carhouse will be capable of housing seventy-five cars, and will have a complete repair department.

Sand Springs Railway, Tulsa, Okla.—A contract has been let by this company for the construction of a combination freight and passenger station at Tulsa, to cost about $25,000.

POWER HOUSES AND SUBSTATIONS

Arkansas Valley Railway, Light & Power Company, Pueblo, Col.—This company will extend its power lines from Pueblo to Avondale.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.—This company is erecting three new substations between Fort Wayne and Decatur, one being located just south of Fort Wayne, one-half way between the two terminals, and the third just outside of the city limits of Decatur, near the power-house.

Kansas City-Western Railway, Kansas City, Kan.—This company has completed half of the replacement with aluminum of its high-tension line that is between Kansas City and Walcott, 18 miles. The company receives its current at Kansas City, Kan., from the Kansas City Railways Company. The current is stepped up at the receiving station, carried to Walcott and there stepped down for transmission in both directions to Leavenworth and Kansas City, Kan.

Lewiston, Augusta & Waterville Street Railway, Lewiston, Me.—Work has begun on the new freight and power house to be erected at Lisbon Falls for the Lewiston, Augusta & Waterville Street Railway.

INDUSTRIAL NEWS

Review of Trade and Market Conditions

Rolling Stock Purchases **Business Changes** **Trade Literature**

TRACK GRINDER BUSINESS GROWING RAPIDLY

Reciprocating Grinder Sales Show Increase—Deliveries Now Prompt—Grinding Brick Manufacture—New Plant for Brick Making

"When the manufacturers of railway track grinders first offered their machines for sale to the electric railways of this country, grinding was looked upon as a luxury. It is now regarded as an essential factor of improvement in track construction." This statement was recently made by W. B. Goodall, Railway Track Work Company, Philadelphia. He also said: "Many roads are now grinding all of their new track. This assures smooth joints from the start, and defers the time when cupping will begin. The reciprocating process of grinding offers many advantages when the result desired is a smooth rail surface."

The demand for "reciprocating track grinders" is good. Sales in 1915 exceeded those of 1914 by 50 per cent, and the sales this year will exceed those of last year by 30 per cent. The demand has come partly from sources which at first were not expected to buy grinders. Foreign sales also have increased lately. Several small roads, with less than 20 miles of track, have purchased grinders for reclaiming old track. Some of the longer users of this type of grinder are the Third Avenue Railroad, New York, eight grinders; Philadelphia Rapid Transit Company, twelve grinders; Brooklyn Rapid Transit Company, United Railways of Baltimore, and Connecticut Company, each four grinders. The Brooklyn property makes use of a grinder on the elevated tracks of its system. Some of the roads in the Northern States operate their grinders all winter.

The price of the reciprocating track grinder has not been increased even though costs for manufacture and for demonstration have risen in accord with general cost. Delays of material at one time forced the manufacturer to fall three months behind in deliveries, but this condition now has been relieved, and grinders can be shipped promptly.

How Cutting Bricks are Made

The conditions surrounding the manufacture of the abrasive bricks used with the reciprocating grinders are of interest. These bricks, in sets of four, sell for about $4.50 per set. At one time the manufacturer was 5000 bricks behind his orders. Shipments are now made three weeks after receipt of orders, and steps have been taken which will still further accelerate deliveries.

Track-grinding bricks are made in two grades of hardness. Some engineers prefer bricks so hard that they will last as long as five working days. Others prefer the soft grade of brick which cuts the rail much faster but will last only fifteen to twenty hours. The bricks are made of bauxite, imported from Greece and France. It has been difficult to obtain this material since ocean shipping has been restricted. The prepared bauxite is burned in electric furnaces until it is hard and sharp. Then it is crushed and screened to size. Clay and feldspar are then added, and the bricks are molded. Next they are burned in kilns. Ten days' time is required to mix, pour and dry a lot of bricks, and then a week's time is allowed for baking.

Because of the difficulty experienced by the Railway Track Work Company in obtaining abrasive bricks for sale to users of its grinders, the principals of this company have formed and incorporated a new company known as the Abrasive Products Company. One kiln has been installed and bricks are now being made by this company at Thirtieth and Walnut Streets, Philadelphia. Cutting wheels also are being made, and the business is reported to have shown such prospects that this company is now considering the installation of three additional kilns.

Prospects for track grinder sales during 1917 look bright, according to Mr. Goodall, who also says that the accelerating demand for grinder bricks is proof that the roads are making more intensive use of their grinders.

"WIG-WAGS" WITHOUT BELLS ARE RECOMMENDED

Referring to the article on highway-crossing signals published in the issue of Nov. 18, William P. Hall of the Hall Switch & Signal Company, New York, confirms the statement earlier made that the swinging disk commonly known as the "Wig-Wag" has met with great favor by purchasers of such signals. "It is also a fact," he says, "that this is due to a belief on the part of the railroad companies that an audible signal alone does not fully meet their requirements.

"In the light of our many years of experience in the automatic block signal field, we concluded some time ago that a wig-wag signal so constructed and operated as to indicate danger to the users of highways, both when in motion and in a state of rest, was eminently desirable. We have developed a wig-wag signal which gives warning of danger when in motion, and which, when deprived of its operating current, indicates danger by a fixed position showing red, the latter being insured by gravity.

"Any type of wig-wag signal which indicates danger only when in motion may become a positive danger to highway traffic when interrupted in its normal movement by a lack of power, therefore we believe that the wig-wag, constructed and operated as described, is more desirable than the combined use of the ordinary wig-wag and bell. If the current used for the operation of the bell should fail there is absolutely no signal of danger in one case, whereas, if the current used for the operation of the wig-wag signal should fail, the signal would still indicate danger to highway traffic by assuming a fixed red position. It also appears that the plan of using the wig-wag only eliminates the oftentime very objectionable features of the noisy bell at highway crossings."

COPPER PRICES FORCED DOWN SLIGHTLY BY PEACE PROPOSALS

Although showing considerable and somewhat unexpected strength on the proposal for peace offered by the Teutonic Allies for a few days, the copper market was apparently unable to stand the strain any longer. December copper is more than a cent lower than the high price of a week ago, and on Tuesday following the declaration of the position held by England regarding Germany's proposals December electrolytic was quoted at 34 cents bid, 34.5 cents asked. January copper was quoted at 32.75. Quotations for 1917 were as follows: First quarter, 32.25; second quarter, 31.25; third quarter, 30.25, and fourth quarter, 29.75. As will be noticed, the greatest reaction was in copper for early delivery. Copper for last quarter 1917 delivery was affected least of all.

While the reaction has not been great, there is considerable uneasiness among the buyers. Every day there appears on the market a number of small lots up to 200 and 300 tons of spot copper. How much more of this resale copper is held is not known. It is well known that producers are sold out, but it had generally been understood that practically all sales had been made by consumers and the volume of copper held for speculation was exceedingly small.

Copper wire manufacturers and manufacturers of electrical goods stand in a very unsatisfactory position should there be a large amount of copper available for speculation. Stocks were laid in at top-notch prices, and in many cases these stocks were very substantial. Both wire and electrical manufacturers have orders on their books for deliveries way into 1918, and unfilled orders would keep the factories going night and day well through 1917, and great care was taken to prevent any uncertainty of delivery through lack of raw materials.

WHO SHOULD KEEP THE STOCK OF RENEWAL PARTS?

This topic, previously mentioned in the issues of Nov. 25, page 1135, and Dec. 2, page 1183, has brought forth many very interesting views from manufacturers of standardized and other products. In the following discussion of this topic, Charles M. Sneider, development department, The Jeffrey Manufacturing Company, Columbus, Ohio, sets forth another view. He says:

"Stock-keeping is far from being an office boy's job. The question of the stock of renewal parts is one of mutual responsibility wherein the purchaser should consider the cost of first repairs in connection with the cost of the original apparatus. The manufacturer should be able to inform the purchaser as to when the first repairs should be needed under nominal service conditions and how soon such repairs can be supplied upon order or out-of-stock. The extent to which repair parts are required should be the basis of carrying the same in stock, care being taken to keep in touch with the matter of obsolete and new designs so as to slow up sufficiently in anticipation of new designs and not to have a large quantity of "dying" repairs on hand. This latter feature is the common fault with over-zealous stock departments.

"The head of an efficient service stock department is not the first step from the office boy's job—not even in a country town. The stock department should be in charge of a capable man, fully acquainted with the product, the trade demands and the matter of new designs."

ROLLING STOCK

People's Railway, Dayton, Ohio, is said to be in the market for ten motor cars.

People's Railway, Dayton, Ohio, has ordered ten trailer cars from the W. R. Kershner Company.

Lake Shore Electric Railway, Cleveland, Ohio, has placed an order for thirteen interurban cars and five city cars with the Jewett Car Company.

Cleveland, South Western & Columbus Railway, Cleveland, Ohio, has placed an order with the Kuhlman Car Company for six interurban cars.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., is building three passenger cars and one freight car for use on its newly acquired line between Fort Wayne and Decatur, Ind.

Buffalo & Lake Erie Traction Company, Buffalo, N. Y., noted in the Eelctric Railway Journal of Dec. 9, 1916, as being in the market for fifteen center-entrance interurban cars, has ordered this equipment from the Kuhlman Car Company.

Columbus (Ohio) Railway Power & Light Company is said to be in the market for five city cars and three interurban cars. A recent issue of Electric Railway Journal noted that this company was planning to rebuild forty-five cars in its own shops, but these plans have been changed. The company now plans to have new car bodies built by the American Car Company, making use of the hardware and equipment from the old cars as far as possible.

Michigan Railway, Jackson, Mich., has specified the following details for the twenty prepayment passenger cars which it has recently ordered from the St. Louis Car Company:

Seating capacity	40
Weight (car body only),	19,000 lb.
Bolster centers, length	19 ft.
Length of body	28 ft.
Over vestibule	40 ft. 4 in.
Width over sills	8 ft. 2 in.
Over all	8 ft. 6 in.
Height, rail to sills	31 ft.
Sill to trolley base	8 ft. 5¼ in.
Body	Semi-steel
Interior trim	Mahogany
Headlining	Agasote
Roof, type	Turtle deck
Underframe	Metal

New York (N. Y.) Municipal Railway Corporation reported in the Electric Railway Journal of Nov. 11, 1916, page 1046, as asking for bids on 100 subway cars, will probably exercise an option on 100 subway cars in addition to the 500 cars already contracted for, which 100 cars will be similar in construction to the present equipment and will probably be purchased during the year 1917. The specifications for this equipment are as follows:

Name of road,	New York Municipal Railway
Type of car	Closed passenger
Seating capacity	78 to 90
Weight (car body only),	45,000 lb.
Bolster centers, length	47 ft.
Length of body:	
Over vestibule	66 ft. 2¼ in.
Width over sills	9 ft. 9 in.
Over all	10 ft.
Height, rail to side sills,	3 ft. ½ in.
Side sill to top of roof,	9 ft. 1⅜ in.
Body	Metal
Interior trim	Steel and Agasote
Headlining	Agasote
Roof, type	Compromise
Underframe	Metal
Air brakes	Westinghouse
Axles,	Carnegie quenched and tempered
Bumpers	Hedley anti-climber
Cables,	New York Municipal Railway's specification
Car trimmings,	Bronze and aero metal
Control, type	Westinghouse
Couplers	Westinghouse
Curtain fixtures,	Curtain Supply Company
Curtain material	D. C. Pantasote
Destination signs,	Hunter illuminated
Door operating mechanism,	National Pneumatic
Gears and pinions,	GE Grade "F"
Hand brakes	Geared
Heaters	Electric
Journal boxes	Malleable iron
Motors, type and number,	GE-248A 2 per car
Motors, outside or inside hung,	Inside, 1 per truck
Paint	Enamel system
Sash fixtures	Edwards'
Seats, style,	Longitudinal and transverse
Seating material	Rattan
Step treads	No steps
Trucks, type	Arch bar
Ventilators	Perry—24 per car
Wheels,	Carnegie solid steel, National Malleable Castings Co.
Special devices, etc.,	Draw bar centering device, Westinghouse empty and load brake, Smith Ward slack adjusters, Selective acceleration device.

London & Port Stanley Railway, London (Ont.), Canada, which has just placed an order with the Jewett Car Company for two three-compartment closed motor cars, has specified the following details for this equipment:

Type of car,	Three compartment, closed, motor
Seating capacity	68
Weight (car body only),	49,733 lb.
Bolster centers, length,	45 ft. 4 in.
Length of body	64 ft. 6 in.
Over vestibule	70 ft.
Width over sills	9 ft. 6 in.
Over all	9 ft. 10 in.
Sill to trolley base	9 ft. 10¼ in.
Body	Steel
Interior trim	Mahogany
Headlining	Agasote
Roof, type	Monitor
Underframe	Steel
Air brakes,	GE straight and automatic
Bumpers	Spring
Car trimmings	Bronze
Control, type,	GE type M.K. M.U.
Couplers	Tomlinson
Curtain fixtures	Ring type
Curtain material	Pantasote
Fenders or wheelguards,	Steel pilots
Gears and pinions,	GE Grade "M"
Gongs	Pneumatic
Hand brakes	Peacock brakes
Heaters	Consolidated Electric
Headlights	U. S. incandescent
Motors, type and number,	4 GE No. 225 B 750-1500 v.
Motors, outside or inside hung,	Inside
Sanders	Air
Seats, style	High back
Seating material,	Plush and pantasote
Trolley base	Pantographs used
Ventilators	Automatic

TRADE NOTES

Rochester Light & Power Company, Detroit, Mich., has ordered two 2000-kw. rotary converters for railway service from the General Electric Company.

Lord Manufacturing Company, New York, N. Y., reports an order of 100 Horne double-acting brakes from the Laconia Car Company for use on surface cars being built for the Boston Elevated Railway.

Buffalo & Lake Erie Traction, Buffalo, N. Y., has placed an order with the General Electric Company for fifteen double motor equipments, for the necessary air brakes, and for a 500-kw. rotary converter equipment.

J. B. Hill, W. E. Schwob and H. G. Miller, Iowa City, Iowa, announce the organization of the Schwob-Miller Engineering Company, to engage in a general practice as consulting and designing engineers, with offices in the Phœnix Block, Iowa City.

Bound Brook Oil-Less Bearing Company, Bound Brook, N. J., announces the appointment of William Fisher Jennings as Eastern sales manager of that company. Mr. Jennings has been connected with the company for almost three years and is well known to the trade.

F. Castiglioni, electrical engineer of the Railway Improvement Company, on leave of absence serving in the Italian Army, has been promoted in the 84th territorials heavy artillery. Signor Castiglioni left for the front June 1, 1916, on the Regina D'Italia. Readers of this paper will remember him as the author of technical articles on railway operation.

H. W. Johns-Manville Company, Cleveland, Ohio, announces that every employee with the company a year or more was gladdened by the receipt of a Christmas greeting signed by President T. F. Manville announcing the board of directors' decision to give a bonus equal to 10 per cent of the year's salary. This action was prompted by the very satisfactory earnings of the company in 1916 and the splendid service rendered by the J-M employees.

SKF Ball Bearing Company, Hartford, Conn., announces that S. B. Taylor, sales manager of the company, has been appointed vice-president to succeed F. B. Kirkbride, who remains on the board of the company. Mr. Taylor will remain in charge of sales. G. A. Ungar, former representative of the company in Cleveland, Detroit and Pittsburgh, has been appointed technical manager and chief engineer, succeeding Uno Forsberg, who returns to Sweden after completing his work of creating the manufacturing organization of the SKF Ball Bearing Company in this country.

National Pneumatic Company, New York, N. Y., reports that it has received an order from the Toledo Railways & Light Company for twenty-five sets of manual door control for equipping cars which are being remodeled. This company's manual door control, with safety interlocking feature, has been specified on the fifteen cars recently ordered by the Buffalo & Lake Erie Traction Company, and its door engines have been specified on the six cars ordered for the Cleveland, South Western & Columbus Railway.

ADVERTISING LITERATURE

Findley Electric Porcelain Company, Findley, Ohio, is distributing a bulletin on "Standard Electrical Porcelain."

Cutler-Hammer Manufacturing Company, Milwaukee, Wis., has issued booklet M on magnetic switch control apparatus.

Holland Trolley Supply Company, Cleveland, Ohio, is distributing pamphlets on its Bishop sleet cutter and Holland sleet wheels.

Ohio Brass Company, Mansfield, Ohio, has issued a bulletin on its all-copper type and on its steel terminal type gas-weld bonds.

Nash Engineering Company, South Norwalk, Conn., has issued bulletin No. 4 descriptive of its turbine vacuum and low-pressure boiler-feed pumps.

Berry & Zimmerman, Philadelphia, Pa., is distributing bulletin No. 4 of "Development," which contains an article "Grasp," of interest to the industries and public utilities.

Westinghouse Church Kerr & Company, New York, N. Y., has issued a pamphlet on some of the products of plants or factories designed and constructed by the company.

W. K. Palmer Company, Consulting Engineers, Kansas City, Mo., announces that the company has opened a branch office at 705 Merchants Loan & Trust Company Building, Chicago, Ill.

Ohmer Fare Register Company, Dayton, Ohio, is distributing a reprint of an article which appeared in the *Denver Tramway Bulletin* for October on the Ohmer system of fare protection.

American Appliances & Machinery Manufacturing Company, Brooklyn, N. Y., announces that after Dec. 15 it will occupy its new factory building at 161 Jamaica Avenue. The building contains 4500 sq. ft. of floor space.

Standard Electric Tool Company, Cincinnati, Ohio, has issued bulletin A-53 on its portable electric drills and grinders. In addition to the regular types of a.c. and d.c. drills, this company has a number of ball-bearing tool post grinders, parallel grinders, aerial grinders and bench grinders.

Railway Storage Battery Car Company, New York, N. Y., has issued bulletin No. 33 describing its car No. 316, which operates on the Chattahoochee Valley Railway between West Point, Ga., and Riverview, Ala. This car is equipped with Edison storage batteries. Actual operating costs per car-mile are also given in a table.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued leaflet 3764-A, describing and illustrating its No. 323-V railway motor. This motor has a rating of 30 kw. at 600 volts and is said to represent the latest development in railway motors of the split-frame type. This company has also issued circular 1577, which treats briefly and concisely the question of standard railway equipment.

Hubbard & Company, Pittsburgh, Pa., is distributing a pamphlet on "Continuity and How." This pamphlet devotes considerable space to pin failures and gives the result of a number of tests on the new Pierce forged steel pin, which is made by this company. The various pin lengths recommended by a number of insulator manufacturers are given and the different manufacturers' insulators and pins are fully illustrated and described.

National Tube Company, Pittsburgh, Pa., exhibited a series of three industrial motion picture films illustrating the manufacture of pipe, from ore to finished product, at a meeting of the American Institute of Electrical Engineers, West Lynn, Mass., on Dec. 20, 1916. These pictures were taken under the direction of the company after eight months' work and at an expenditure of several thousand dollars. These films start at the Mesaba ore ranges in Minnesota and follow the ore, step by step, until it is shipped out as finished pipe.

Chicago (Ill.) Pneumatic Tool Company has issued bulletin No. 263 on its Boyer railway speed recorder. This machine consists of a rotary pump, a cylinder and a piston. Oil is used as a circulating medium, the pump chamber and the cylinder being entirely filled. By examining a chart which pulls around a drum in the upper part of the machine, the exact speed at which the train passed any point on the road, the number and location of stops, the distance, speed and location of any backward movement that may have been made can be determined at a glance.

Grip Nut Company, Chicago, Ill., has issued a bulletin of a recommended process in using grip nuts. A number of tables are given showing the economy of using grip nuts in lieu of double nut process, another showing the economy of using grip unit nuts in lieu of United States standard nuts and grip nuts, a third table showing the economy of using grip holding nuts in lieu of United States standard nuts and grip nuts. Grip nuts are used on draft rigging, box and column bolts, side rods and frames, frogs and crossings, air brake equipment, brake beams and brake beam hanging poles.

J. G. Wilson Corporation, Norfolk, Va., is distributing catalog No. 34½, which describes and illustrates its rolling doors, shutters and partitions in steel and wood. This eighty-page catalog shows a number of street railway carhouses equipped with interlocking slat rolling steel doors. Among these are the Cleveland Street Railway, Cleveland, Ohio, Pittsburgh Railways, Mount Washington, Pa., and the Washington & Alexander Railway, Baltimore, Md. The doors are operated with standard chain hoists and are equipped with improved automatic release, controlled a fusible length by means of which the doors close automatically should the temperature reach 150 deg. Fahr.

General Electric Company, Schenectady, N. Y., has issued bulletin No. 44417, describing and illustrating its GE-258 ventilated commutating pole railway motor. This motor was designed especially for light-weight, one-man cars, and is built in two types, one being suitable for 24-in. wheels and a 4-in. axle diameter, the other being built for 30-in. wheels and a maximum of 4½-in. axle. Both types have an hourly rating of 25 hp. on 600 volts. The motors are designed to use a maximum gear ratio which will give the car speed necessary to maintain the usual city schedule. A number of tables given indicate the capacity of this motor and will assist materially in determining whether this motor is suitable for any desired schedule.

Hall Switch & Signal Company, 30 Church Street, New York, N. Y., is distributing bulletin No. 20, which describes and illustrates its new highway crossing signal and its Universal crossing bell. The signal is of the wigwag type, which gives an oscillating movement on either side of the center. Should the apparatus from whatever cause become deranged, the danger or stop indication is automatically displayed. The bell, which can be mounted on the top of a 4-in. iron post, strikes approximately three times a second, which gives a more effective warning than that given by a gong struck at a more rapid rate. This equipment has been generally installed on railroads in connection with automatic block systems and for highway crossing protection.

A Little Milk on the Window-Sill

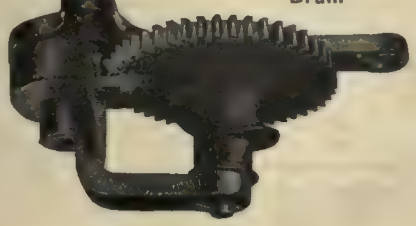
Irish fairies, **daoine maithe** (good people), were easily pleased.

If you left a little milk on the window sill for them over night, they would do their best to keep misfortune from you.

PEACOCK BRAKES are easily pleased, too.

All they ask to insure you against misfortune is a little maintenance milk now and then!

And don't forget that in these dangerous days of winter a well-cared-for Peacock Brake is an especially valuable shield against the misfortunes of ice, snow, mist and slippery rails.



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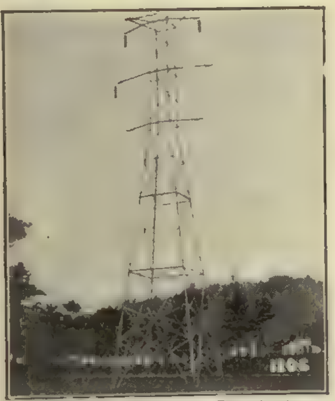

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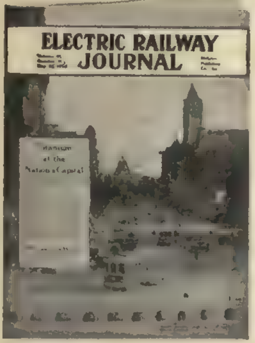
Copy Changes. If no proofs are desired your advertisements should be in our hands Wednesday of the week preceding date of publication, otherwise your latest advertisement in accordance with schedule will be repeated.

New Advertisements (not changes of copy) can usually be accepted up to noon Wednesday of the week of publication, but no guarantee can be given as to location or proofs or indexing.

Searchlight Advertisements (Proposals, Wants, For Sale, etc.) received as late as 10 A. M. Thursday will be published if there is space available in the pages that go to press last. The paper is dated and mailed Saturday.

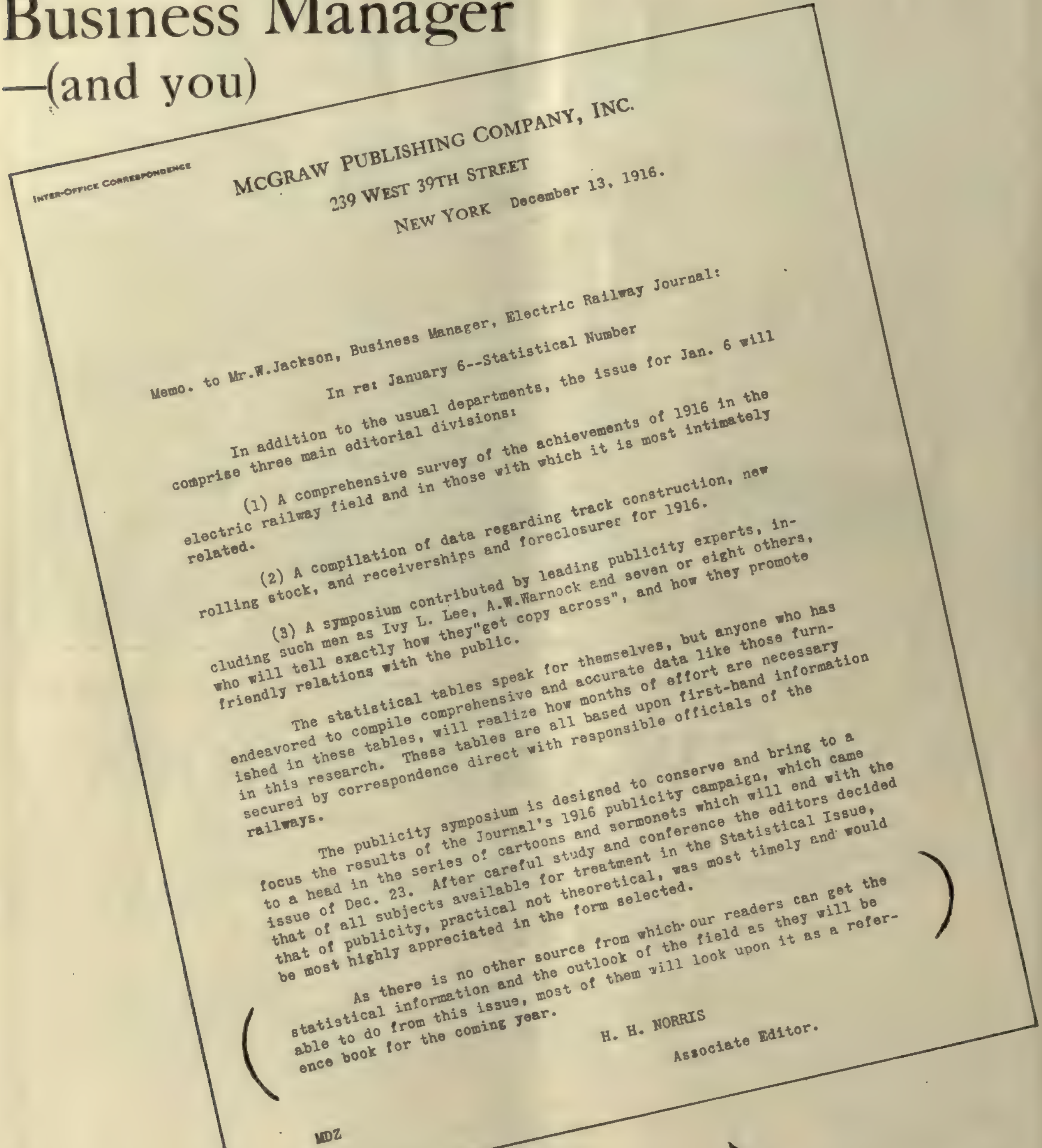


THESE are not arbitrary rules. We do our best to give our advertisers what they want—work overtime if necessary—but each advertising form has to be on the press at a specified time. That is why we cannot guarantee proof or location unless we have copy on time. We want our advertising space to work at maximum efficiency for our advertisers.

The Paper is dated and mailed Saturday

Electric Railway Journal, 239 W. 39th St., New York

A Tip from an Editor to the Business Manager
—(and you)



INTER-OFFICE CORRESPONDENCE

McGRAW PUBLISHING COMPANY, INC.
239 WEST 39TH STREET
NEW YORK December 13, 1916.

Memo. to Mr.W.Jackson, Business Manager, Electric Railway Journal:

In re: January 6--Statistical Number

In addition to the usual departments, the issue for Jan. 6 will comprise three main editorial divisions:

(1) A comprehensive survey of the achievements of 1916 in the electric railway field and in those with which it is most intimately related.

(2) A compilation of data regarding track construction, new rolling stock, and receiverships and foreclosures for 1916.

(3) A symposium contributed by leading publicity experts, including such men as Ivy L. Lee, A.W.Warnock and seven or eight others, who will tell exactly how they"get copy across", and how they promote friendly relations with the public.

The statistical tables speak for themselves, but anyone who has endeavored to compile comprehensive and accurate data like those furnished in these tables, will realize how months of effort are necessary in this research. These tables are all based upon first-hand information secured by correspondence direct with responsible officials of the railways.

The publicity symposium is designed to conserve and bring to a focus the results of the Journal's 1916 publicity campaign, which came to a head in the series of cartoons and sermonets which will end with the issue of Dec. 23. After careful study and conference the editors decided that of all subjects available for treatment in the Statistical Issue, that of publicity, practical not theoretical, was most timely and would be most highly appreciated in the form selected.

As there is no other source from which our readers can get the statistical information and the outlook of the field as they will be able to do from this issue, most of them will look upon it as a reference book for the coming year.

H. H. NORRIS

Associate Editor.

MDZ

Make the most of it—

Run a full page at least in the ANNUAL STATISTICAL NUMBER (January 6th). Send your copy or ask us to prepare a suggestion for you.

ELECTRIC RAILWAY JOURNAL

Babbitting Bearings
the Columbia Way

Day in, day out, the same men babbitt Columbia axle bearings.

That fact means more than a low production cost for us.

It means the advantages of a reasonable price and the skill of a specialized service for you.

Babbitting bearings is not a rainy-day job with us; it's a regular job handled in a regular way.

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- Tension stands

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- Armature and field coils
- Brush-holders and brush-holder springs
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- Brake forgings, rigging, etc.
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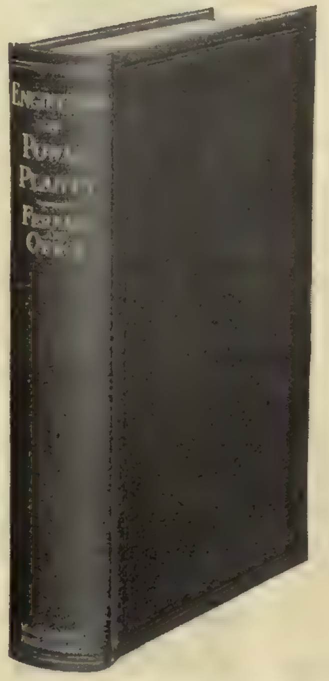

Engineering of Power Plants

(Just Issued)

By **Robert H. Fernald,** M.E., A.M., Ph.D.
Whitney Professor of Dynamical Engineering, University of Pennsylvania, and

George A. Orrok, M.E.
Consulting Engineer, New York
formerly Mechanical Engineer, The New York Edison Company.

586 *pages, 6x9, 309 illustrations,* $4.00 (*English price* 17 *shillings*), *net, postpaid.*

Both Dr. Fernald and Mr. Orrok are acknowledged authorities in the field of power plant design and operation.

In this book power plant problems are attacked from the strictly "common sense" viewpoint. For that reason, the book is splendidly adapted to the needs of the practical man, who requires a book that is clear, concise, usable, and "get-at-able," in every way.

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Don't trust to your more limited facilities for refilling fuses. As fuse specialists, we furnish reliable and carefully ***tested Renewal Links*** all ready to insert in

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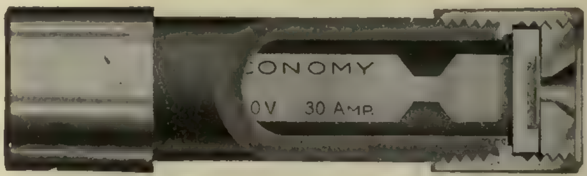

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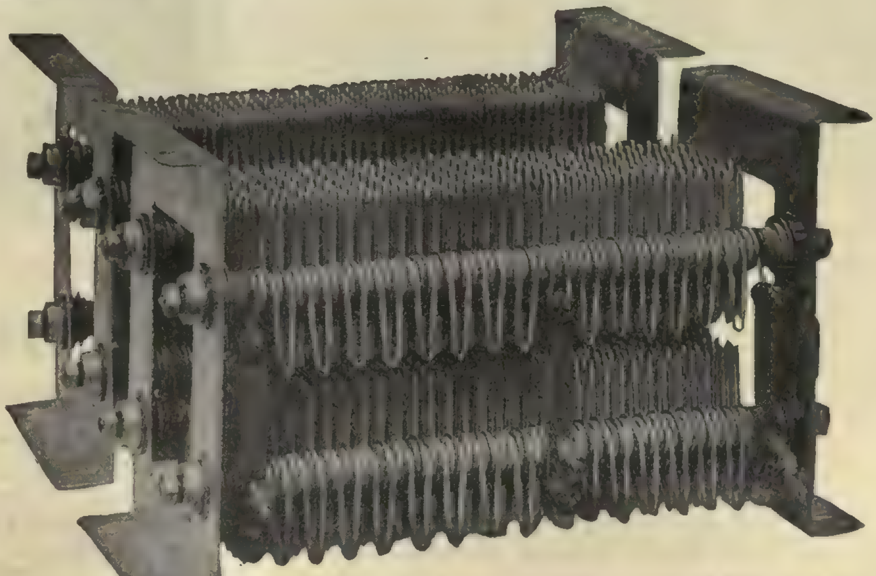

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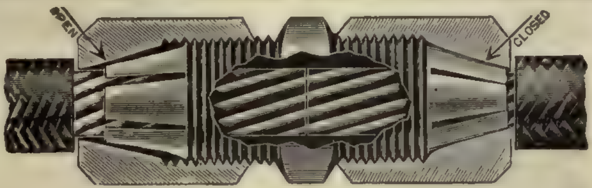

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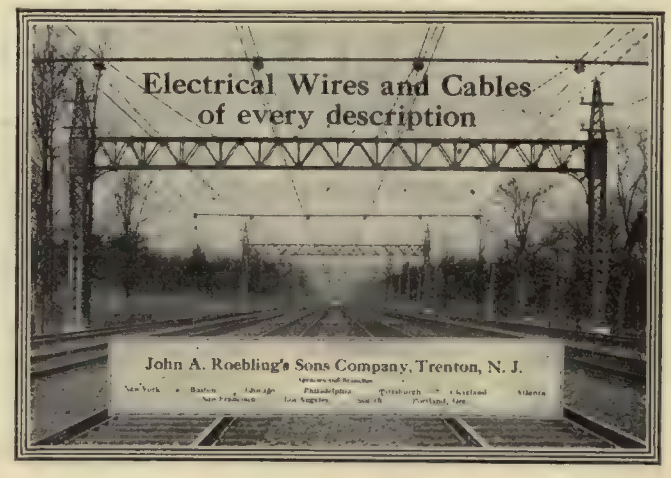
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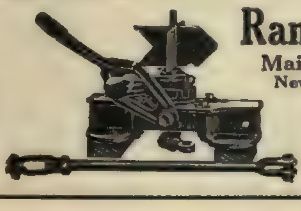

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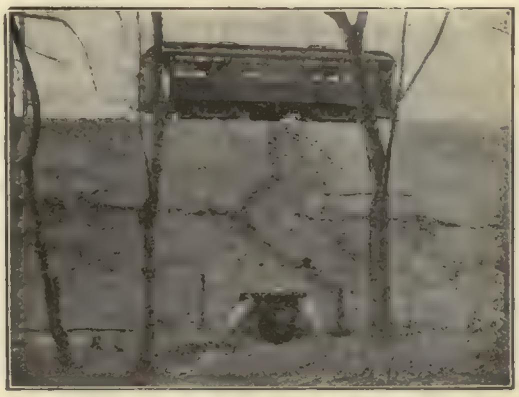

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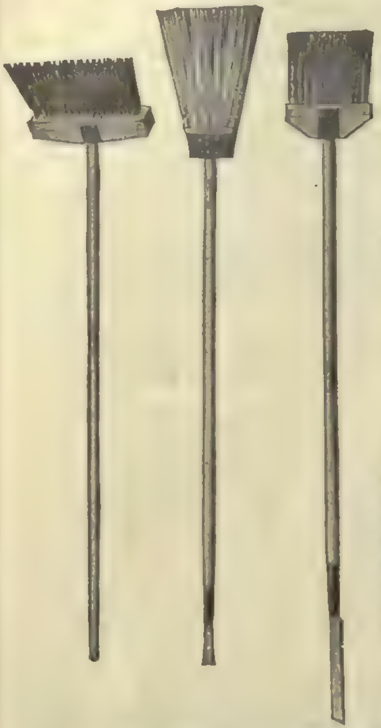

No. 1 to sweep crossings.

No. 2 to handle light dirt and snow in the frogs, switches, and curves.

No. 3 to remove ice, slush and mud from the same places and a chisel point on the end of the handle to loosen the ice and crust.

No. 1 and No. 3 contain Flat Steel Tempered Wire, and nothing superior can be produced. Serviceable all the year round. Your road is not complete without them.

Write for Prices.

J. W. PAXSON CO., Mfrs.
1021 N. Delaware Ave., Philadelphia, Pa.

AWARDED PANAMA PACIFIC INTERNATIONAL EXPOSITION GRAND PRIZE

American Rail Bonds

Crown
United States
Twin Terminal
Soldered

American Steel & Wire Company
Chicago New York Cleveland Pittsburgh Worcester Denver

Export Representative: U. S. Steel Products Co., New York
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The Acetylene Blow Torch

Prest-O-Torch

Quicker and cheaper than a gasoline blow-torch for brazing and soldering

For factories, repair shops, linemen, dentists, jewelers, the Prest-O-Torch saves time and money. Used with Prest-O-Lite Tanks—ready made gas. Intense, concentrated flame instantly lighted. No depreciation, safe and convenient. Style "A," price, 75c (Canada, 85c) will braze up to ⅝ inch round rod. Style "C" for heavier work, $2.25 (Canada, $2.75). Special styles for dentists. Write for literature or send order now. Money refunded if not satisfied.

The Prest-O-Lite Co., Inc. 805 Speedway Indianapolis, Ind.
Canadian Main Office and Factory, Merritton, Ont.

The Babcock & Wilcox Company
85 Liberty Street, New York

WATER TUBE STEAM BOILERS

Steam Superheaters Mechanical Stokers

Works: BARBERTON, OHIO—BAYONNE, N. J.

BRANCH OFFICES:

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BOSTON, 35 Federal St.
CHICAGO, Marquette Building.
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DENVER, 435 Seventeenth St.
HAVANA, CUBA, Salle de Aguiar 104.
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LOS ANGELES, I. N. Van Nuys Bldg.
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PHILADELPHIA, North American Building.
PITTSBURGH, Farmers' Deposit Bank Bldg.
SALT LAKE CITY, 705-6 Kearns Bldg.
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On Ball, Web or Base—It's All One to the Lincoln System

—equally adapted for all these methods of bonding.

The electric arc blends the copper of the bond and the steel of the rail into one structure, without in the least affecting the crystalline structure of the rail.

We want an opportunity to show you how to save from 20 to 50 cents on every bond you install.

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Agents: Lewis & Roth Company, 312 Denckla Bldg., Philadelphia, Pa.; Charles N. Wood Company, 79 Milk St., Boston, Mass.

Foster Superheaters

Insure uniform superheat at temperature specified

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"Philosophy of Protective Paint"
is a booklet for the man who likes to dig deep into the subject. It's not *all* about

DIXON'S SILICA GRAPHITE PAINT

Ask us and a copy is yours. 108-B is its number.
Made in Jersey City by the
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Established 1827

STERLING
Insulating Varnishes and Compounds
HIGHEST GRADE STANDARD OF QUALITY

Clear and Black Air Drying Insulating Varnishes
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Oil Proof Finishing Varnishes
Impregnating Compounds
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FOR THE MANUFACTURER—OPERATOR—REPAIRER

Inquiries invited. Catalogue on request.
We gladly assist in selection.

THE STERLING VARNISH COMPANY
PITTSBURGH, PENNA.
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Full Power with High or Lower Adjustment

Many emergencies requiring a powerful jack present a difficulty in bringing the jack to bear on the load. The

Buckeye Emergency Jack No. 239 Special

saves time, strength and trouble. The many positions to which it is adjustable easily solve perplexing lifting problems. Full details in our catalog. Write for it.

The Buckeye Jack Mfg. Co.
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3

Continuous Operation of the Power Plant

is a matter of extreme importance to the electric railway man. There must be no failure to supply the current when it is needed.

The constant use of Dearborn Treatment guarantees a high percentage of efficiency from the boilers. Made to suit the water conditions shown by analysis, it keeps the boilers free from scale, so that they steam freely and quickly, all corrosive or pitting action of the water is arrested, and, in fact, the boilers are in condition to yield their full quota of power constantly, while the fuel consumption is greatly reduced.

Send gallon of water for analysis, and let us advise regarding your plant requirements.

Dearborn Chemical Company
McCormick Building, Chicago

Packard
Insulating VARNISHES

Keep Your Equipment Out of the Repair Shop
No matter what your operating conditions may be we can furnish varnishes to meet them for field and armature coils, transformer coils, etc.
Send for samples and test them out on your work. We'll both be satisfied with the result.
Special Varnish Bulletin E. R. J. on request.

The Packard Electric Company
WARREN, OHIO

GECO PATENTED APPLIANCES

GREEN CHAIN GRATE STOKERS
For Water Tube and Tubular Boilers
GREEN ENGINEERING CO.
East Chicago, Indiana
Bulletin No. 1—Green Chain Grate Stokers
Bulletin No. 2—Geco Steam Jet Ash Conveyors

FORD TRIBLOC
A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only Block that carries a five-year guarantee.
FORD CHAIN BLOCK & MFG. CO.
142 Oxford Street, Philadelphia

Murphy Automatic Furnace
233

RAISES the possibility of efficient stoking to a maximum.
Write for catalog "C."
MURPHY IRON WORKS
Detroit, Mich. U.S.A.

DISFICO
"WHALEBONE"
Fibre Track Insulation
DIAMOND STATE FIBRE CO.
Elsmere, Del. Bridgeport, Penna. Chicago, Ill.

Do You Handle Your Ashes with *Only One Man?*

The SKIP HOIST can be operated by a common laborer.

A pull on the rope causes the bucket to ascend, discharge and return *automatically*.

Write for prices on this device, also for catalog No. 20, an encyclopedia of all modern coal and ashes handling systems.

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111 S. 5th St., Philadelphia

Repair Shop Machinery and Cranes

Built by

NILES-BEMENT-POND CO.
111 Broadway, New York
Boston Philadelphia Pittsburgh Chicago
St. Louis Birmingham, Ala London

WE CAN CUT YOUR COST OF HEATING CURRENT
WRITE FOR THERMOSTATIC CONTROL INFORMATION

GOLD

ELECTRIC HEATERS Cut Installation and Maintenance Charge.
VENTILATORS Also Ventilate in Stormy Weather.
THERMOSTATS Save Current.
ORIGINATED the use of NON-CORROSIVE Wire for Electric Car Heaters.
ORIGINATED The Ventilated Coil Support.

LET US FIGURE ON YOUR NEXT REQUIREMENTS
Gold Car Heating & Lighting Co., 17 Battery Pl., New York

THE readers of technical papers are busy men. Don't expect one flash of the Searchlight to reveal them all—or one insertion of your advertisement to be read by them all. **Order your Want or For Sale Advertisement published four times or more.** If all of the insertions are not needed we will return the full amount received for whatever space is not used.

Searchlight Department,
ELECTRIC RAILWAY JOURNAL

Ventilation—Sanitation—Economy—Safety
All Combined in,
THE COOPER FORCED VENTILATION HOT AIR HEATER
Patented September 30, 1913. Ask for the full story.
We Also Manufacture Pressed Steel Hot Water Heaters
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Heating and ventilating your cars is the problem today. Let us show you how to do both with one equipment. Now is the time to consider this change before you start your cars through the shops for overhauling. Kill two birds with one stone.

THE PETER SMITH HEATER COMPANY
1759 Mt. Elliott Ave., Detroit, Mich.

The Big Three
D & W Fuses, Deltabeston Wire Delta Tape
D & W Fuse Co., Providence, R. I.

INSULATING TAPE of Quality
STANDARD Woven Fabric Co
Walpole, *Mass.*

KINNEAR Steel Rolling Doors
FOR CAR HOUSES
Compact, Durable, Easily and Speedily Operated and Fireproof. Openings of any size may be equipped and the doors motor-operated if desired. Manufactured by the
KINNEAR MANUFACTURING CO., Columbus, Ohio
BOSTON PHILADELPHIA CHICAGO

THE CUTTER ELECTRICAL AND MANUFACTURING CO. PHILADELPHIA
CIRCUIT I-T-E BREAKERS

I. T. E. Circuit Breakers
for heavy street railway work are the best obtainable. Write for New Complete Catalogue.

The Men Who Plan and Execute

owe some of their efficiency to the thought, energy and resourcefulness of manufacturers who supply the means for such achievements.

These men know how important it is for them to keep in touch with the manufacturers.

In the electric railway industry, such men find the easy, certain and thorough way to keep in touch with manufacturers is through the advertising pages of the

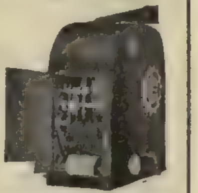
Electric Railway Journal

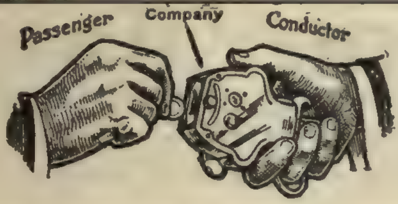
239 West 39th Street New York

The Best Shade Rollers for Cars

SPECIAL shade rollers for cars, that will last and give satisfaction for years, and yet cost but little more than the poorest you can buy, are made by the Stewart Hartshorn Co., E. Newark, N. J. This company is by far the largest shade roller manufacturer in the world. It is able to give high quality at lower prices because of the enormous output. Write for catalog, stating wants. You are always protected when you buy shade rollers if they bear the signature Stewart Hartshorn

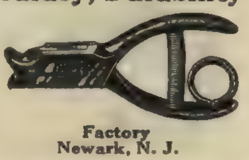
For the Answer to your Fare Collection Problems
Write for
"Earnings Per Passenger Mile"
It tells how the
BONHAM TRAFFIC RECORDER
Will Meet Your Needs
The Bonham Recorder Co., Hamilton, Ohio





Direct Automatic Registration
By the
Passenger
Rooke Automatic Register Co.
Providence, R. I.

The Standard for Speed, Accuracy, Durability
B-V Visible Punch
Look for this
B-V.
Trade Mark
Bonney-Vehslage Tool Company
124 Chambers Street
New York City
Factory
Newark, N. J.



A "Long Life" Heater

that affords a maximum circulating efficiency and maintains an even temperature—the

Consolidated Panel Heater

The patented circulating back keeps a stream of agreeably warmed air constantly flowing into the car—and prevents burnouts of the heating elements.

Consolidated Panel Heaters are in use on 70,000 of the 90,000 cars in the United States.

Our descriptive bulletins will tell you more about them. Sent upon request.

Consolidated Car-Heating Co.
New York Albany Chicago

Johnson Registering Fare Boxes

used in connection with the car register increase receipts $1.00 per car, per day, counts metal tickets the same as cash thus giving a positive check on all class of fares.

WRITE FOR NEW BOOKLET

JOHNSON FARE BOX COMPANY
Jackson Blvd. & Robey St. Chicago, Ill.
U. S. Metal & Manufacturing Co. 165 Broadway, New York City, N.Y.

International Specialties Talk for Themselves

Money-counting fare boxes; Coin and metal ticket counting fare boxes; Coin registers; Coin and transfer registers; Coin, metal ticket and transfer registers; Motor-driven registers; Round and square registers; Badges; Punches and Bell cord.

THE INTERNATIONAL REGISTER CO.
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MASON SAFETY TREADS—prevent slipping and thus obviate damage suits.

KARBOLITH CAR FLOORING—for steel cars is sanitary, fireproof and light in weight.

STANWOOD STEPS—are non-slipping and self-cleaning.

Above products are used on all leading Railroads. For details address
AMERICAN MASON SAFETY TREAD CO.
Main Offices: Lowell, Mass.
Branch Offices: Boston, New York City, Chicago, Philadelphia, Kansas City, Cleveland, St. Louis.

Trolley Pole Shipments from Stock
7000 Poles on Hand

High carbon, Butt-welded poles made from Special Skelp—sufficiently flexible but without taking a permanent bend at 35 to 40 pound wheel pressure.

Nuttall Pittsburgh

This is the hub bearing of a HENSLEY Trolley Wheel after the rim is worn out.

HENSLEY Wheels require no bushing and maintain a perfect bearing in the hub until ready to be scrapped.

Our new catalog explains the merits of HENSLEY Wheels.

Our trial proposition proves these merits.

Hensley Trolley & Mfg. Co.
Detroit, Mich.

PANTASOTE
The National Standard
for Car Curtains and
Car Upholstery
AGASOTE HEADLINING
The only headlining made in one solid piece. Will not separate, warp or blister. Waterproof and homogeneous.
The Pantasote Company
11 Broadway, New York People's Gas Bldg., Chicago, Ill.
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The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.

THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

RAILWAY UTILITY CO.
Sole Manufacturers
"Honeycomb" and "Round Jet" Ventilators
for Monitor and Arch Roof Cars, and all classes of buildings; also
Electric Thermometer Control
of Car Temperatures.
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The Eclipse Railway Supply Co.
CLEVELAND, OHIO
Manufacturers of the
ECLIPSE LIFE GUARD
ECLIPSE TROLLEY RETRIEVER
ECLIPSE WHEELGUARD
ACME FENDER

Have you our new
Trolley Wheel Bulletin
Write for your copy
The Eureka Company North East, Pa.

PROVIDENCE FENDERS H-B LIFE GUARDS
The Consolidated Car Fender Co., Providence, R. I.
Manufacturers of The Providence Fender and H-B Life Guard
Wendell & MacDuffie Co., 61 Broadway, New York
General Sales Agents

ELECTRIC RAILWAY DEVICES
Rectifier for Frozen Air Pipes.
High Power Compact Hand Brakes, Gear or Differential Types.
Sterling Light Weight Roller Bearing Trolley Bases.
Screenless Air Cleaners for Compressors
Sterling Sand Boxes.
Berg Fenders and Wheel Guards.
Multi-Vapo-Gap Lightning. Arresters and Hydrogrounds.
Trigger Lock Reversible Controller Fingers.
"Q-P" Trolley Catchers.
Soldered Rail Bonds.
Friction and Insulating Tapes.
Sterling Ticket Punches.
Controller Handles.
LORD MFG. CO.,
105 W. 40th St., New York

Saved from the Ashes as many tickets are, means nickels lost to you. Avoid the risk.

Patten Ticket Destroyer is used right in the office under the eyes of trustworthy employes.

It mutilates beyond redemption.

Scrap sold will pay for the machines.

Ask us for Circular J.

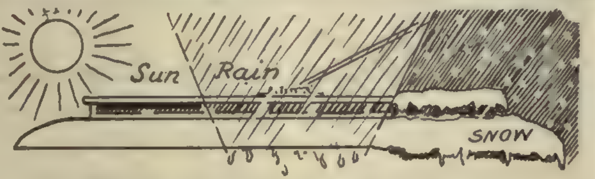
PAUL B. PATTEN CO.
78 Lafayette St., Salem, Mass., U. S. A.

ECONOMY
BUILT LIKE A WATCH
METERS

—the only means at your disposal to accurately measure the power consumption of cars. You can well afford to investigate. Bulletin 416.

Sangamo Electric Company
Springfield, Illinois

New York, 50 Church St. Rochester, Mercantile Bldg. Minneapolis, Met'p'ltan Life Bldg. Los Angeles, San Fernando Bldg



"Bayonne" Car Roofing
Made and impregnated to withstand the elements
Only One Color Coat Necessary at Home

Made from a closely-woven special fabric, every fibre of which is treated with a *preservative* which renders it proof against the quick deterioration to which ordinary painted cotton duck is susceptible. Neat in appearance—saves time, maintenance and prevents leakage. Three weights, yellow and brown, widths from 22 to 120 inches. *Compare the samples!*
FADELESS—WATERPROOF.

John Boyle & Co., Inc., 112-114 Duane St., N. Y.
Branch House, 202-204 Market St., St. Louis, Mo.

"Watch Your Step"

If it has
Universal Safety Tread
on it,
Proceed in Safety.
If Not,
Be Careful

Universal Safety Tread Co., Waltham, Mass.
New York Philadelphia Chicago

The "Hycap-Exide" Battery
for
STORAGE BATTERY STREET CARS
THE ELECTRIC STORAGE BATTERY CO
PHILADELPHIA

"Boyerized" Products Reduce Maintenance

Bemis Trucks	Manganese Brake Heads
Case Hardened Brake Pins	Manganese Transom Plates
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Case Hardened Nuts and Bolts	Bronze Axle Bearings

Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.

Bemis Car Truck Co., Springfield, Mass.

GURNEY CAPACITY ENDURANCE
GURNEY
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RADIO-THRUST
BALL BEARING
JOURNAL BOXES

Have that interchangeability of parts which prevents mistakes in assembly and installation.

GURNEY BALL BEARING CO.
CONRAD PATENT LICENSEE
Chicago JAMESTOWN, NEW YORK New York

TULC

MANY SYSTEMS ARE USING TULC
after first making most thorough tests under all conditions. Such tests have shown that it will cut lubrication costs in half.

THE UNIVERSAL LUBRICATING CO.
Schofield Building CLEVELAND, O.

JACKS

Barrett Track and Car Jacks
Barrett Emergency Car Jacks
Duff Ball Bearing Screw Jacks
Duff Motor Armature Lifts

The Duff Manufacturing Co., Pittsburgh, Pa.

VAN DORN COUPLERS
are made for every condition and requirement. M. C. B. Pin and Link, Car and Air, in all sizes and types.

VAN DORN COUPLER CO.
2325 So. Pauling St., Chicago, Ill.

SEARCHLIGHT SECTION

IMMEDIATE SHIPMENT

400 Kilowatt 60 Cycle Rotary Converter

1—400 KW. Westinghouse, 3 ph., 60 cy., 370 v. A. C., 575 v. D. C., speed 600 revolutions.

200 Kilowatt 60 Cycle Rotary Converters

2—200 KW. Westinghouse, 3 ph., 60 cy. rotary converters, 370 v. A. C., 575 v. D. C., 720 rpm., with starting motors, also transformers if desired.

150 Kilowatt 60 Cycle Rotary Converters

2—150 KW. Westinghouse 3 phase, 60 cycle rotary converters, 550 volts, 273 amps., 720 r.p.m., complete with 4—100 KW. Westinghouse Scott connected oil insulated transformers, 10,000/9500 volts prim., 430/362 volts secy.

150 Kilowatt 25 Cycle Rotary Converters

2—150 KW. General Electric type T. C., 4-150-750, 25 cycle, 3 phase, 575 volt, rotary converters, 750 r.p.m., complete with end play and speed limit device.

Transformers

3—185 KVA. Gen. Elec., type A. C., 25 or 60 cycles, 2300 volts primary, 430 volts secondary.

4—125 KW. Westinghouse transformers, single phase, 60 cycles, 15,000 volts primary, 340/360 v. secondary.

4—100 KW. Westinghouse transformers, oil insulated, single ph., 60 cy., 2300 v. primary, 360 v. secondary.

4—100 KW. Westinghouse, oil insulated, Scott connected transformers, 10,000/9500 v. primary, 430/362 v. secondary.

3—75 KW. Westinghouse, oil insulated, 60 cycle, 6600 or 13,200 v. primary, 220 v. secondary.

Railway Motors

2—75 to 90 HP. Westinghouse No. 112 Railway Motors, newly rewound, practically new.

IMMEDIATE DELIVERY

ARCHER & BALDWIN
114-118 Liberty Street New York City
TELEPHONE 4337-4338 RECTOR

CARS FOR SALE

OPEN and CLOSED
MOTOR and TRAIL
Write for Price and Full Particulars to
ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

Wanted Daily 100,000 Lbs.

CLEAN COPPER SCRAP
NEW BRASS CLIPPINGS
SHRAPNEL CASE SCRAP

CONSOLIDATED ROLLING MILLS & FOUNDRIES CO. INC.
25 BROAD ST., NEW YORK CITY

MACGOVERN & COMPANY, Inc.

114 LIBERTY STREET NEW YORK CITY

Steam and Electrical Machinery

Air Compressors, Pumps, Hoists, etc.

FOR SALE

250 K. W. 550 volt Westinghouse Generator direct connected to Hamilton Tandem Compound Engine. Splendid condition, can be inspected under operation.

Mobile Light and Railroad Co.
Mobile, Ala.

COMPLETE ARMATURES FOR SALE

FOR ALL THE STANDARD STREET RAILWAY MOTORS
GET OUR PRICE WE CAN SAVE YOU MONEY
America's Greatest Repair Works
CLEVELAND ARMATURE WORKS, Cleveland, O.

It Would Be Almost a Miracle

if one or more of the 8,000 men who regularly receive the JOURNAL did not happen to want that used machine which you want to sell. The

Searchlight Section

brings buyers and sellers together

Copy received until Wednesday noon for publication in the issue of that week

Get Your Wants into the Searchlight

SEARCHLIGHT SECTION

Get your Wants into the Searchlight

ADVERTISING RATES

Under "Positions Wanted," including Salesmen looking for new connections, Evening Work Wanted, etc. undisplayed advertisements cost **two cents a word,** minimum charge 50 cents an insertion, **payable in advance.**

Under "Positions Vacant," including Agents and Agencies Wanted, Representatives Wanted, Salesmen Wanted, Partners Wanted, Business Opportunities, Employment Agencies, and Miscellaneous For Sale, For Rent, and Want ads; also Auction Notices, Receivers' Sales, Machinery and Plants For Sale or Wanted, undisplayed advertisements set solid in one paragraph, cost **three cents** a word, minimum charge $1.50 an insertion.

Machinery advertisements (undisplayed) set with a paragraph for each item, or tabulated, are charged at 25 cents a line.

If replies are in care of any of our offices, allow five words for the address.

All advertisements for bids (Proposals) cost $2.40 an inch.

ADVERTISEMENTS IN DISPLAY TYPE

cost as follows for single insertions:

1/16 p. (1⅛x3⅜ ins.)	$5.00	1 in. (1x2 1/16 ins.)	$3.00
⅛ p. (2⅜x3⅜ ins.)	10.00	4 inches (4x2 1/16 ins.)	11.60
¼ p. (5x3⅜ or 2⅜x7 ins.)	20.00	8 inches (8x2 1/16 ins.)	22.40
½ p. (10¼x3⅜ or 5x7 ins.)	40.00	15 inches	40.50

For space to be used within one year, to be divided to suit requirements of advertiser, provided some space is used at least once a month following first insertion:

1 page	$80 a page	18 pages	$56 a page
3 pages	72 a page	26 pages	52 a page
6 pages	64 a page	32 pages	50 a page
9 pages	62 a page	40 pages	48 a page
12 pages	58 a page	52 pages	45 a page

In replying to advertisements, do NOT enclose original testimonials, or anything that you may want returned. State your qualifications in as concise and neat a manner as you can and enclose COPIES of testimonials. In machinery ads, use a local name or address if possible so that readers can wire direct and get quick replies.

FOR SALE

Armature Coils

3 Sets GE-1200 Railway Motor Armature coils. Catalog No. 18069. Immediate shipment. If interested address Hagerstown & Frederick Ry. Co., Terminal Bldg., Frederick, Md.

FOR SALE

20, 25, 26, 40 and 46 foot girder

BRIDGES

Coopers E 37 and 37½ specification. All in first class condition. Taken out only on account of new heavy power. Address:

N. C. FOSS

Purchasing Agent, Ann. Arbor R. R.

TOLEDO, OHIO

RAILROAD DISMANTLED and For Sale

39 Miles 60-lb. Relaying Rail and Fastenings, Locomotives, Passenger and Freight Cars, Watertanks, Turntables, Motor, Hand and Push Cars, Track Tools, Etc.

Located in Iowa. Ready for Loading.

W. HARDING DAVIS

214 North Sixth St. St. Louis, Mo

For Sale Cheap

STEEL RAILS

500 Tons 68 lb.
1000 Tons 58 lb.
2000 Tons 50 lb.
500 Tons 40 lb.
300 Tons 20 lb.

Also large quantities of other sections. These are practically as good as new and at a fraction of the cost.

Before Buying

LOCOS, CARS, EQUIPMENT, MACHINERY, TANKS, ETC.

see what Zelnicker offers.

ZELNICKER IN ST. LOUIS

423 First Nat'l Bk., Chicago
910 Hennen Bldg., New Orleans
Main Office, 425 Locust St., St. Louis

FOR SALE

Stock Taking Time

Now is the time to turn the surplus stock of metals you have on hand into cash. We buy all grades of scrap metals, small lots as well as large lots. Write us today and tell us what you have and we will be pleased to quote you prices. National Metal & Rubber Company, 30-31 India Wharf, Boston, Mass.

Trolley Wire For Sale

One O trolley wire, 5081 feet new wire still in freight house. Immediate delivery at prices less than the market. Address H. A. Sawyer, Mgr., Amesbury, Mass.

Power Plant Equipment For Sale

Entire Power Plant Equipment consisting of 1 200 K.W., 2 80 K.W. 550 Volt, D.C., M.P., belt driven Generators. 1 250 H.P., 2 125 H.P. Automatic Horizontal Steam Engines. 3 Boilers. 2 Pumps. Heater, etc. Plant located on New York Central tracks, Charlotte, N. Y., has been superseded by Niagara Falls Power. Rochester & Manitou R. R. Co., 160 Beach Ave., Charlotte, N. Y.

For Sale

13,000 ft. 2/0 plain trolley wire.
8,000 ft. 4/0 plain feed wire.
25,000 ft. 4/0 triple braided feed wire.
1 Passenger Car.
1 Combination Baggage and Passenger Car.
Rails all sizes.
Henry A. Hitner's Sons Co., Station K, Philadelphia, Pa.

Immediate Delivery

Boiler feed pump, capacity 75 gal. per minute, against a 500-ft. head at 3200 r.p.m. Dayton Turbin pump direct connected to Kerr steam turbine. Mesaba Railway Co., Virginia, Minn.

MISCELLANEOUS WANTS

Turbo-Generator Wanted

A turbo-generator of about 2000 kw., 3 phase, 25 cycles, 2300 volts. Give description of machine and say where it can be inspected. Box 1299, Elec. Ry. Journal.

POSITIONS WANTED

ENGINEER, experienced in electric railway, cars and substations, open about Feb. 1 for position as assistant to consulting engineer or superintendent of construction. Box 1295, Elec. Ry. Jour., 935 Real Estate Trust Bldg., Phila., Pa.

POSITIONS WANTED

ENGINEER, in responsible charge of public utility valuation and regulation work of the most important character, wishes to find positions for a number of high class assistants experienced in the valuation, accounting and management of railroads, gas, electric light, water and steam heating plants. The salaries of the assistants referred to for a number of years have been from $2,500 to $4,200 a year, but the work upon which they are engaged is nearing completion. Box 1291, Elec. Ry. Jour.

GENERAL foreman wants position. Married, 35, reliable, experienced. Now assistant general shop foreman for city and interurban road. References. Box 1294, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

GENERAL manager electric railway and lighting properties open for position. Twenty years' experience handling properties for large banking concern. Box 1236, Elec. Ry. Jour., 935 Real Estate Trust Bldg., Philadelphia, Pa.

PURCHASING AGENT and general storekeeper with company operating city and interurban cars desires position. 40 years of age, good habits and highest references. Experience covers steam and electric, both construction and maintenance, as well as freight, general freight agent and accounting. Familiar with Public Service and Interstate classifications. Box 1292, Elec. Ry. Jour.

SITUATION wanted in car barn electrical department, by young man. Three years' electrical inspection in steel mills, some knowledge of electric car work, I. C. S. student, single and strictly sober, would take foremanship on small road. Write 567 Cypress Ave., Moxham, Johnstown, Pa.

WANTED—Position as assistant to operating official of an electric railway by a young man who is familiar with the operation of both city and interurban systems, also knowledge of light and power. Box 1293, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

YOUNG man, six years in executive offices large Eastern street railway and lighting company. Now law clerk legal department. College graduate; member of bar. Can handle legal and claim work. Good assistant to busy executive. Box 1223, Elec. Ry. Jour., 935 Real Estate Trust Bldg., Philadelphia, Pa.

POSITIONS VACANT

ACCOUNTANT wanted for public utilities company in Southwest, a thoroughly competent man. Salary $3,000-$4,000 per annum. Box 1298, Elec. Ry. Jour.

EXPERIENCED cost and quotation clerk wanted, electrical supply house. State age, experience, salary. Box 1259 Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

More than 300 different products are here listed.

The Alphabetical Index (see eighth page following) gives the page number of each advertisement.

As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.

If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will promptly furnish the information.

Acetylene Apparatus. (See Cutting Apparatus, Oxy-Acetylene.)

Acetylene Service.
Oxweld Acetylene Co.
Prest-O-Lite Co., Inc.

Advertising, Street Car.
Collier, Inc., Barron G.

Air Cleaners.
Lord Mfg. Co.

Air Rectifiers.
Lord Mfg. Co.
National Safety Device Co.

Alloys and Bearing Metals. (See Bearings and Bearing Metals.)

Alloys, Steel and Iron.
Titanium Alloy Mfg. Co.

Anchors, Guy.
Electric Service Supplies Co.
Holden & White.
Ohio Brass Co.
Union Electric Co.
Westinghouse Elec. & M. Co.

Anti-Climbers.
Railway Improvement Co.

Automobiles and Buses.
Brill Co., The J. G.

Axle Straighteners.
Columbia M. W. & M. I. Co.

Axles, Car Wheel.
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Cincinnati Car Co.
St. Louis Car Co.
Standard Steel Works Co.
Westinghouse Elec. & M. Co.

Babbitting Devices.
Columbia M. W. & M. I. Co.

Badges and Buttons.
Electric Service Supplies Co.
International Register Co., The

Bankers and Brokers.
National City Co.

Batteries, Storage.
Electric Storage Battery Co.

Bearings and Bearing Metals.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
St. Louis Car Co.
Westinghouse Elec. & M. Co.

Bearings, Center.
Baldwin Locomotive Works.
Holden & White

Bearings, Roller and Ball.
Gurney Ball Bearing Co.
Railway Roller Bearing Co.

Bearings, Roller Side.
Holden & White.

Bells and Gongs.
Brill Co., The J. G.
Electric Service Supplies Co.
St. Louis Car Co.

Benders, Rail.
Niles-Bement-Pond Co.
Zelnicker Sup. Co., W. A.

Blow Torches for Soldering and Brazing. (See Cutting Apparatus, Oxy-Acetylene.)

Blowers.
General Electric Co.
Westinghouse Elec. & M. Co.

Boilers.
Babcock & Wilcox Co.

Boiler Cleaning Compounds.
Dearborn Chemical Co.

Bond Clips.
Electric Railway Improve. Co.

Bond Testers.
American Steel & Wire Co.

Bonding Apparatus.
Electric Railway Improve. Co.
Ohio Brass Co.
Oxweld Acetylene Co.
Prest-O-Lite Co., Inc.

Bonding Tools.
American Steel & Wire Co.
Electric Railway Improve. Co.
Electric Service Supplies Co.
Ohio Brass Co.

Bonds, Rail.
American Steel & Wire Co.
Electric Railway Improve. Co.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Union Electric Co.
Westinghouse Elec. & M. Co.

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Lincoln Bonding Co.

Book Publishers.
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel.
Niles-Bement-Pond Co.

Braces, Rail.
Kilby Frog & Switch Co.

Brackets and Cross Arms. (See also Poles, Ties, Posts, Etc.)
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Bates Expanded Steel Truss Co.
Electric Service Supplies Co.
Int'l Creosoting & Constr. Co.
Lindsley Bros. Co.
Ohio Brass Co.
Union Electric Co.

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Holden & White.
Smith-Ward Brake Co.

Brake Shoes.
Amer. Brake Shoe & Fdy. Co.
Barbour-Stockwell Co.
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Long Co., E. G.
St. Louis Car Co.

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Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Holden & White
Long Co., E. G.
Lord Mfg. Co.
National Brake Co.
National Safety Device Co.
St. Louis Car Co.
Westinghouse Trac. B. Co.

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American Bridge Co.

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Zelnicker Supply Co., W. A.

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Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Brushes, Carbon.
Dixon Crucible Co., Jos.
General Electric Co.
Jeandron, W. J.
Morgan Crucible Co.
Westinghouse Elec. & Mfg. Co.

Brush Holders.
Anderson Mfg. Co., A. & J. M.

Bumpers, Car Seat.
Electric Service Supplies Co.

Buckets, Grab.
Beaumont Co., R. H.

Bunkers, Coal.
American Bridge Co.
Beaumont Co., R. H.

Bunting.
Boyle & Co., Inc., John.

Bushings, Case Hardened and Manganese.
Bemis Car Truck Co.

Bushings, Fibre.
Diamond State Fibre Co.

Buttons. (See Badges and Buttons.)

Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.)

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc.—(See those headings.)

Car Trimmings. (For Curtains, Registers, Doors, Seats, etc., see those headings.)

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cincinnati Car Co.
Jewett Car Co.
Kuhlman Car Co., G. C.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Second Hand.
Electric Equipment Co.

Cars, Self-Propelled.
Electric Storage Battery Co.
General Electric Co.

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Consolidated Car-Heating Co.

Castings, Brass.
Frankel Connector Co.

Castings, Composition or Copper.
Anderson Mfg. Co., A. & J. M.

Castings, Gray Iron and Steel.
Amer. Brake Shoe & Fdry. Co.
American Bridge Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Long Co., E. G.
St. Louis Car Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.

Castings, Malleable and Brass.
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Long Co., E. G.
St. Louis Car Co.

Catchers and Retrievers, Trolley.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Holden & White.
Long Co., E. G.
Lord Mfg. Co.
Ohio Brass Co.
Union Electric Co.
Wood Co., Chas. N.

Ceiling, Car. (See Headlining.)

Chain & Belt Machinery.
Beaumont Co., R. H.

Charging Sets, Storage Battery.
General Electric Co.

Cheese Cloth.
Boyle & Co., Inc., John.

Chemists.
Little, Inc., Arthur D.

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Cutter Electrical & Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

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Frankel Connector Co.

Clamps and Connectors for Wires and Cables.
Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co.
Frankel Connector Co.
General Electric Co.
Klein & Sons, Mathias.
Ohio Brass Co.
Union Electric Co.
Westinghouse Elec. & M. Co.

Cleaners and Scrapers, Track. (See also Snow - Plows, Sweepers and Brooms.)
Brill Co., The J. G.
Cincinnati Car Co.
Ohio Brass Co.

Cleats, Car Wiring.
General Electric Co.

Clusters and Sockets.
General Electric Co.

Coal and Ash Handling. (See Conveying and Hoisting Machinery.)

Coasting Clocks.
Railway Improvement Co.

Coil Banding and Winding Machines.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

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Cleveland Armature Works.
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D & W Fuse Co.
General Electric Co.
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Westinghouse Elec. & M. Co.

Coils, Choke and Kicking.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coin-Counting Machines.
International Register Co., The
Johnson Fare Box Co.

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Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co
Wood Co., Chas. N.

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General Electric Co.

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Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
Westinghouse Elec. & M. Co.

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General Electric Co.
Westinghouse Trac. B. Co.

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General Electric Co.
Westinghouse Elec. & M. Co.

Is YOUR Capital Gathering Cobwebs?

It is if any of it is tied up in old field coils.

We can help you put these coils to work again. Send them to us and let us reconstruct them. We remove the old insulation—clean and anneal the copper—then reinsulate it with

SALAMANDER PURE ASBESTOS

which is, in itself, a guarantee against carbonization due to age and breakdown under overload. We then rewind the wire into new coils having just the same characteristics as the old ones.

It's *better* than selling your old coils—and *cheaper* than buying new ones, for our only charge is for the actual insulation used. Ask us to demonstrate the economy of our method.

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FACTORIES: York, Pa., and Weehawken, N. J.

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They are guaranteed to an accuracy of 1/5 of one per cent (in terms of full scale length). They are dead-beat. Each scale is hand-calibrated and has a mirror over which the knife-edge pointer travels. By bringing the pointer tip into line with its image, readings may be made within 1/10 of a division at any part of the scale. In mechanical and electrical workmanship, these Voltmeters practically attain perfection. In external appearance they are very handsome. The metal case has an exceedingly durable royal copper finish. The base is of selected mahogany, highly polished.

A full description of Model 1 Voltmeters will be found in Bulletin No. 501, which will be mailed on request.

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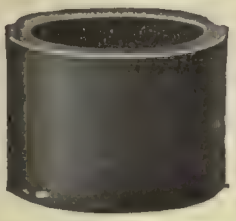

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READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

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Controller Handles.
Lord Mfg. Co.

Controller Regulators.
Electric Service Supplies Co.

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Westinghouse Elec. & M. Co.

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Electric Service Supplies Co.
Samson Cordage Works.
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International Steel Tie Co.

Crossing Signals. **(See Signals, Crossing.)**

Crossings, Track. **(See Track, Special Work.)**

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O'Neill Co., W. Q.
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Pantasote Co., The.
St. Louis Car Co.

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Oxweld Acetylene Co.
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Derailing Devices. **(See also Track Work.)**
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Wisch Service, P. Edward.

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American Steel & Wire Co.
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Electric Service Supplies Co.
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Star Brass Works.

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Diamond State Fibre Co.
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Fibre Insulation.
U. S. Metal & Mfg. Co.

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Flooring Composition.
American Mason Safety Tread Co.

Forgings.
Standard Steel Works Co.

Frogs, Track. **(See Track Work.)**

Furnaces. **(See Stokers.)**

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Daum, A. F.
General Electric Co.
Westinghouse Elec. & M. Co.

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Jewett Car Co.

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Standard Steel Works Co.

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Union Electric Co.
U. S. Metal & Mfg. Co.
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Diamond State Fibre Co.
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General Electric Co.
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Nuttall Co., R. D.
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U. S. Metal & Mfg. Co.

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General Electric Co.

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Allis-Chalmers Mfg. Co.
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Allis-Chalmers Mfg. Co.
General Electric Co
Westinghouse Elec. & Mfg. Co.

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Graphite.
Dixon Crucible Co., Joseph.
Morgan Crucible Co.

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American Bridge Co.

Guards, Trolley.
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Ohio Brass Co.
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Westinghouse Elec. & M. Co.

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Gold Car Heating & Lighting Co.
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Cooper Heater Co.
Smith Heater Co., Peter.

Heaters, Car, Hot Water.
Cooper Heater Co.
Smith Heater Co., Peter.

Heaters, Car, Stove.
Electric Service Supplies Co.
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Packard Electric Co.
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TO DO THIS AMOUNT OF WORK BY HAND WOULD REQUIRE TWENTY LABORERS WITH TAMPING BARS.

With no improvement of the labor situation in sight, this item of making fewer men do more work is of interest to every railway man.

"Imperial" Tampers are simple and easy to operate. They eliminate indifferent tamping by careless workmen and effect a more evenly and firmly tamped roadbed than the best hand tamping.

They work with equal effectiveness in any sort of ballasting material at a rate of speed unapproached by other means.

"Imperial" Tampers are pneumatically operated, usually from a portable compressor. The company manufactures track car and road portable compressors for operation by electric motor or gasoline engine. Where signal or switch service air lines are permanently installed the Tampers can be operated therefrom without impairing the usual service.

"Imperial" Tampers can be fitted with special picks for cutting pavement or concrete roadbed. The Company also offers pneumatic drills, screw spike drivers and hammers for track work.

Bulletin 9023 describes this equipment in detail.
Ask for a copy.

INGERSOLL-RAND COMPANY

11 Broadway
NEW YORK

Offices the World Over

165 Queen Victoria St.
LONDON

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to products manufactured by advertisers in this issue of Electric Railway Journal

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Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Union Electric Co.
Westinghouse Elec. & Mfg. Co.

Insulators, Tree.
Holden & White.

Insurance, Fire.
Marsh & McLennan.

Jack Boxes. (See also Telephones and Parts.)
Electric Service Supplies Co.

Jacks. (See also Cranes, Hoists and Lifts.)
Brill Co., The J. G.
Buckeye Jack Mfg. Co.
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Duff Manufacturing Co.
U. S. Metal & Mfg. Co.

Joints, Rail.
Carnegie Steel Co.
Zelnicker Sup. Co., W. A.

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Long Co., E. G.
Railway Roller Bearing Co.

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Electrical Testing Lab's., Inc.
Little, Inc., Arthur D.

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General Electric Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Acetylene.
Prest-O-Lite Co., Inc.

Lamps, Arc and Incandescent. (See also Headlights.)
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General Electric Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Signal and Marker.
Ohio Brass Co.

Lathes, Car Wheel.
Niles-Bement-Pond Co.

Lifters, Car Step.
Consolidated Car Fender Co.

Lighting Regulators.
Holden & White.

Lightning Protection.
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Boyle & Co., Inc., John.

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Electric Service Supplies Co.
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Made of fine cotton yarn braided hard and smooth. Inspected and guaranteed free from flaws. Proved to be the most durable and economical. Samples and information gladly sent.
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Union Electric Co.

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Standard Steel Works Co.

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The St. Louis
Car Company

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8000 N. Broadway
St. Louis

THE
CINCINNATI
CAR
COMPANY

WORKS:

WINTON PLACE
CINCINNATI, OHIO

Kiko Wusti

In parts of Southern India the native women wear ultra-abbreviated costumes.

Kiko wusti?—you ask, which, reduced to its full English translation, means—*why?*

Our custom collector states that the reason is not because of the intense heat, as one might suppose, but rather because of the advertising value.

Some years ago this information would have been received by the American woman as a distinct shock.

Today, however, she smiles her nod of approval, indicating the American trend toward the conservation of cloth.

How customs change!

Not so long ago when we urged the buying of Morganite carbon brushes on engineering prescription only as opposed to haphazard choice, men who had been buying on chance smiled.

Today they have come to see the advantage of having brushes prescribed in the light of thorough knowledge of both brushes and motor service.

This principle had to win because it gives the buyer advance proof-of-value.

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Factory, Brooklyn, N. Y.

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Printing begins on Tuesday of each week.

Changes of copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for OK before publication.

New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.

If proofs before printing are required, change of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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Titanium-Treated Rails in use at Fall River, Mass.

TITANIUM-TREATED RAIL
in the Bay State

—on the lines of the Bay State Street Railway—have been for some time installed in Fall River and in Methuen, Mass.

In all, 300 tons of 9-in. girder rail and 50 tons of 9-in. guard rail have been installed—both types having received the usual cleansing treatment with 0.1% titanium in the form of Ferro-Carbon-Titanium.

Though these rails cost a little more per ton than ordinary untreated carbon rails, actual service in a wide variety of installations all over the country proves them to have about 40% longer life.

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VIEW OF TRUCK EQUIPPED WITH ROLLER BEARINGS

ROLLWAY BEARINGS

An Illuminating Summary

"Summing up the situation in regard to roller bearings, some of the advantages of their use may be enumerated as follows: Decrease of power, especially at peaks and during acceleration; more coasting; low lubrication and maintenance costs; reduced axle fractures; reduced pull-ins; fewer cars needed, reducing the investment, and possible adoption of smaller motors, and, therefore, less waste.

"The reduced energy demand means, in addition, wear on trolley wire and trolley wheels. With bearings of the anti-friction type, the axles are kept in the exact alignment, while with plain bearings there is considerable lost motion due to journal brass movement in the journal boxes, and to the ends of the journal being pushed to one side of the journal brass. With the anti-friction bearings there is also a reduction in brakeshoe and wheel wear. A car equipped with these bearings will coast further than one with plain bearings, and will accelerate at a higher rate with the same current."

(From an article entitled "Results Obtained with Roller Bearings on Interurban Cars" by W. B. Voth and A. C. Metcalfe, respectively Chief Engineer and Master Mechanic Empire United Railways, Inc., Syracuse, N. Y.)

Think it over

The Railway Roller Bearing Co.

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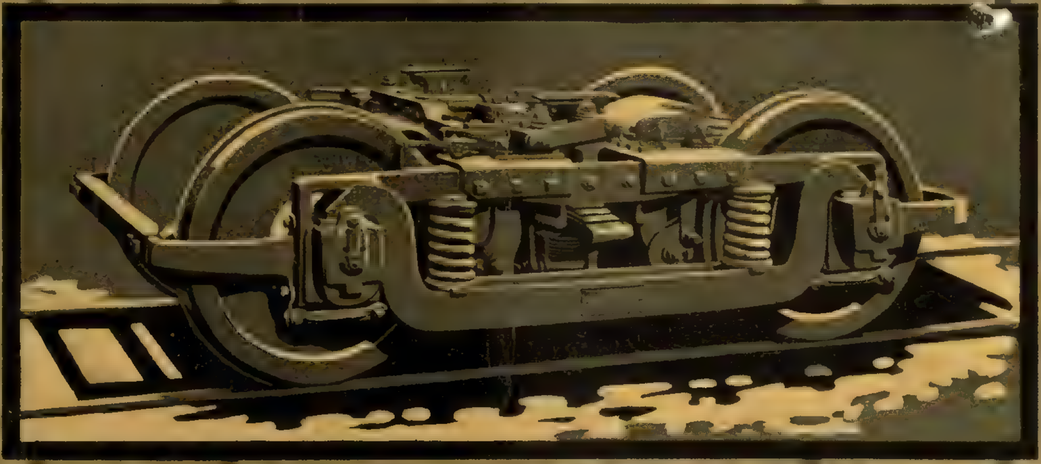

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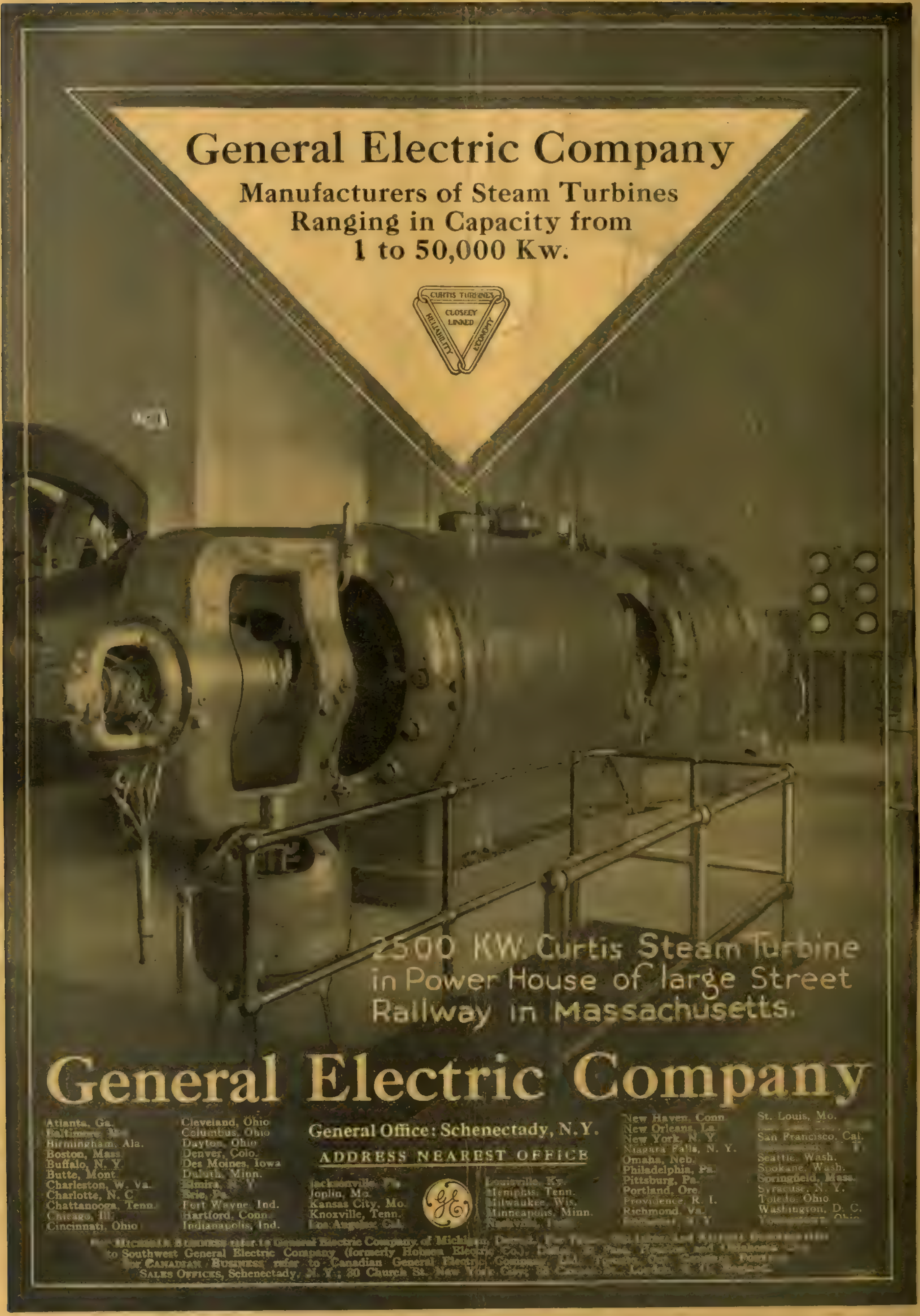

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